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ELECTRICAL REVIEW

FOUNDED 1872

CXXX. No. 3352. FEBRUARY 20, 1942 6d. WEEKLY

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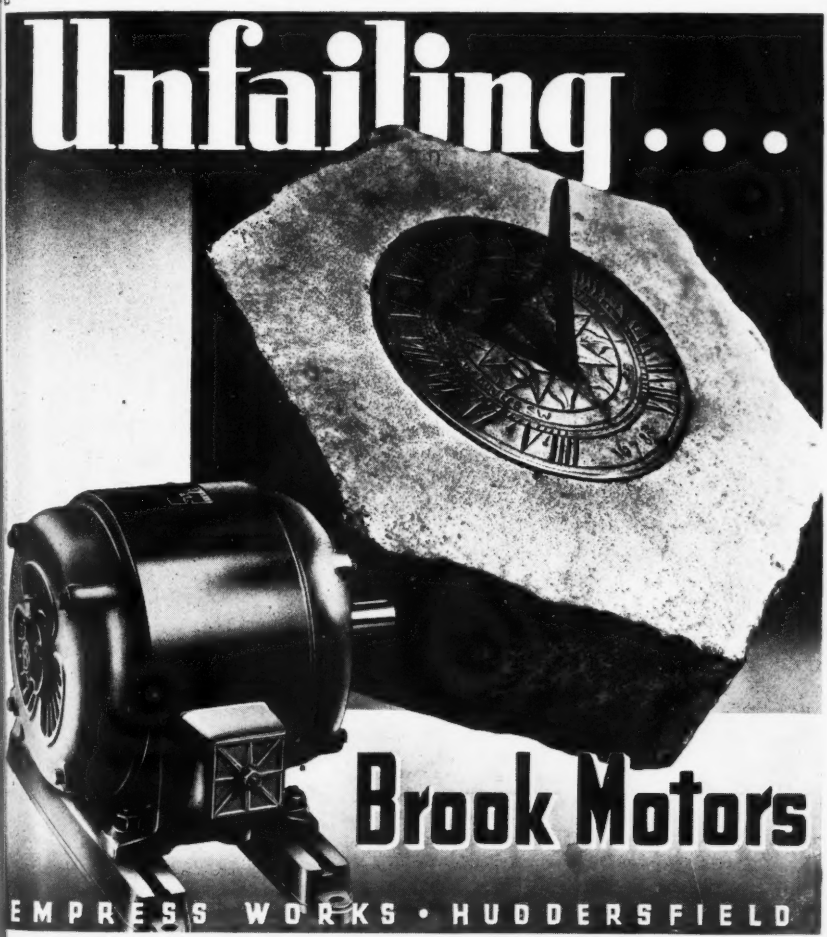

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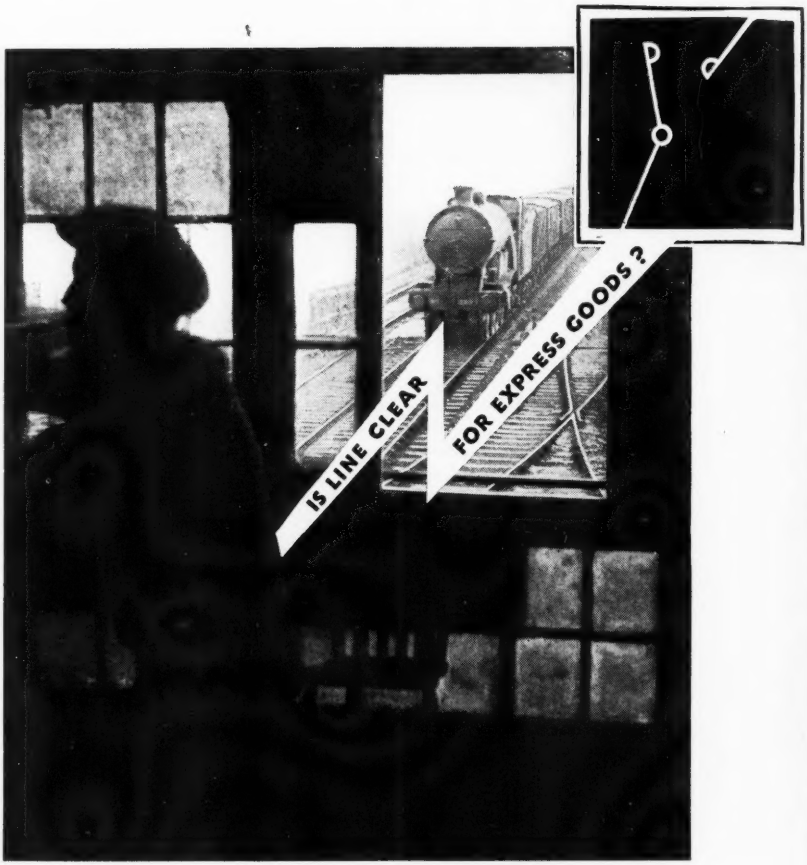

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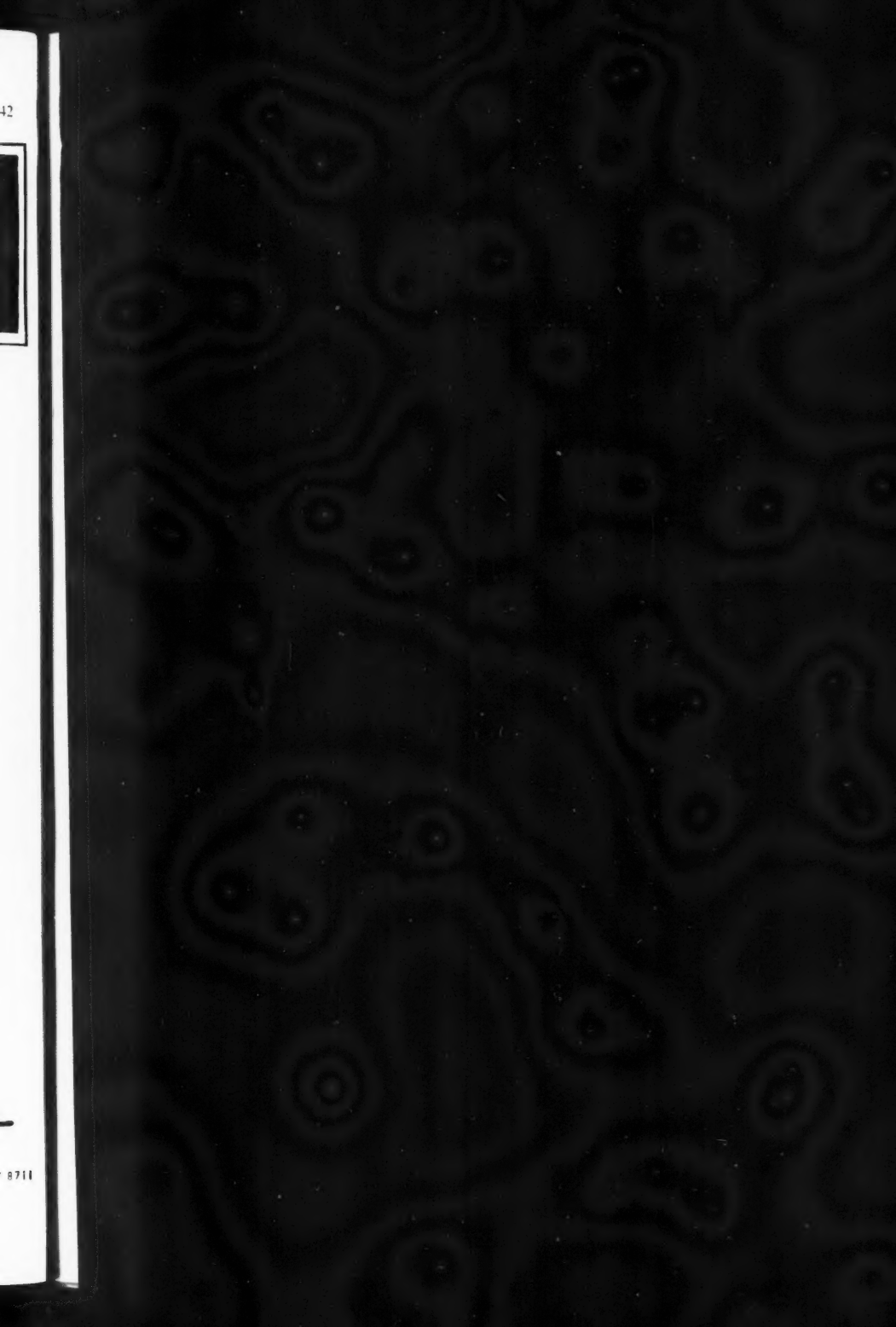

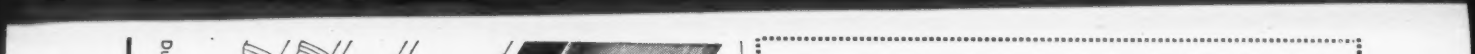

ELECTRICAL REVIEW

Volume CXXX No. 3352

Friday, February 20, 1942

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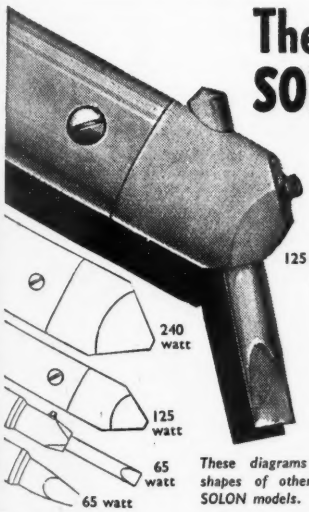

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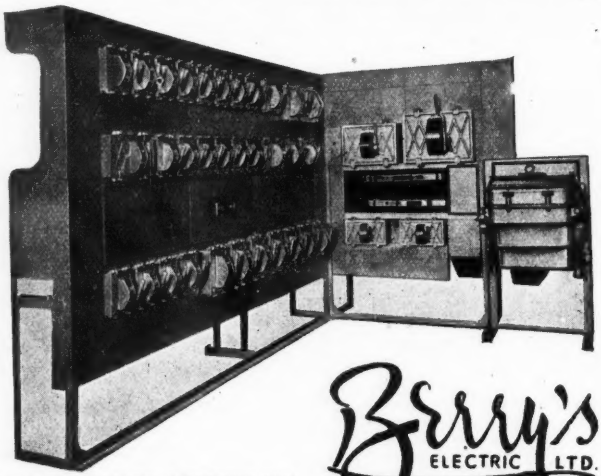

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXX. No. 3352. FEBRUARY 20, 1942 6d. WEEKLY

Rural Electrification

Prospects and Policy

NATIONAL policy in regard to electrification was crystallised at the time of the first Weir Report, some sixteen years ago, into the phrase "a cheap and abundant supply of electricity." The second of these equally important objects has often been overlooked in the gusto with which the public, especially the numerically largest portion which then took electricity for lighting only, looked forward to an era of low flat-rate charges. Thus, low prices have too often been taken as the sole criterion instead of only an important factor in the standard by which the efficiency of public electricity supply should be judged; that is the quality of the service provided to the largest number of consumers.

Supply Authorities' Enterprise

So it was that potential users remote from existing networks would have become "forgotten men" if supply authorities serving large areas had not interpreted their obligations in a broad spirit. An account of what one large undertaking has done in the way of helping the farmer is given in this issue. This is only one of many examples that could be cited, as earlier articles in this journal have shown, of the creditable manner in which rural electrification has been tackled by those to whom it has been entrusted.

As a consequence, electrical progress in sparsely populated areas generally has been much more rapid than seemed probable twenty years ago, taking into account merely the commercial inducements as they appeared at that time. More recent experience and investigations, such as those carried out by the Electrical Research Association (see Report W/T2), justify the holding of a more optimistic view as to the many ways in which electricity can be successfully applied to farming operations.

The prospects have also been improved during the past few years by the use of less expensive types of line construction which, together with the alleviation of various statutory difficulties such as wayleaves, will assist undertakings in planning future rural development schemes. Such schemes will be made more comprehensive when some of the marginal and even submarginal supplies are rendered profitable —a result which is to be expected after the war when publicity programmes are resumed and personal contacts made by experienced domestic and farming salesmen.

Tariff Considerations

A factor which markedly affects the whole issue is that development costs and even a proportion of the standing charges on mains extensions to rural districts have usually to be borne by the profit accruing from supplies to nucleus loads of an urban or semi-urban character. In other words, country dwellers are to a greater or less degree subsidised by the townsmen and cannot justifiably expect, as a right, to receive the same terms. Nevertheless, there is much to be said for offering the same tariff for both, as is done over

thousands of square miles in this country in accordance with the precedent of letter post, if only from considerations of what the traffic will bear, after allowing for the possibility of higher average incomes of rural workers in the future.

More still remains to be done after the war, but clearly there are limits to the extent to which one set of consumers can be called upon to help another financially. Anything further required (and this can be determined only by a survey over a wide area) becomes a matter of national policy, but the question should then be considered primarily as one that concerns agriculture and not electricity supply.

The E.R.A.

THE twenty-first report of the E.R.A., shows that during the second war year it was not merely able to maintain its purely wartime activity but also to support export business and even to extend its overseas contacts, while at the same time preparing for reconstruction after the war. Novel developments made in closer liaison with Government Departments and the fighting services have frequently caused investigational work to be completed and results delivered before the basis of contract has been settled. Excluding confidential war work, some forty-two researches have been in progress.

Financial Considerations

To maintain long-range investigations, and to prepare for the post-war demand for co-operative research, reserves are necessary. The existing reserves are by no means excessive, although in some quarters the position seems to be misunderstood. The existence of these is sometimes put forward as a reason for withholding, or reducing, subscriptions. How wrong such an attitude is may be gauged from the Treasury concession, announced by the president at the annual luncheon, which will permit firms to deduct for taxation purposes all donations to their respective research associations.

Network Distribution

FLEXIBILITY in meeting growing demands and a better use of copper would provide justification enough for pressing the claims of the solid system of distribution. The brunt of criticism in the keen discussion of Mr. B. Wood's I.E.E. Transmission Section paper on city distribution was borne by his proposals to use h.r.c. fuses at a number of points within each network. Further evidence seems to be required that such a course would prove practicable under all fault conditions; yet the alternative of "burning clear" does seem a primitive procedure and is uncertain in its effects where armoured cables are used. Fuse development is not at a standstill, however, and this paper should stimulate thought in the direction of providing what is needed.

Glass Annealing

A GOOD example of the kind of subject that comes within the range of the Installations Section was the paper on the annealing of glass bottles read by Mr. E. S. Morris. The author has found the heating costs with electric lehrs (21 kW loading) appreciably lower than with other types. While the experience of some who contributed to the discussion was not so favourable in this respect, their testimony that the greatly superior performance of electric lehrs thoroughly justified a higher cost of energy provided a telling argument for their adoption.

The Human Factor

WITH whatever knowledge and care codes of regulations and specifications may be drawn up, they will fall short of their purpose unless one condition is observed. That condition was implied by Mr. H. W. Swann, who spoke out of his long experience as Senior Electrical Inspector of Factories, at the luncheon of the "Supervisors" on Saturday last. To make the dry bones live, those who have to work the codes, down to the humblest details, must possess the requisite skill, integrity and interest to make them effective. All three qualities are promoted by corporate relationship through a body that aims at raising the technical proficiency of its members.

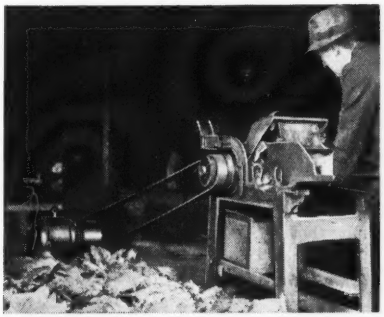
A New One

ELECTRICITY is so often falsely accused of causing fires that it is a bit too bad to see it blamed *in absentia* as it were. Yet we find the *World's Press News* reporting a fire in a Kensington flat as "a lunch-hour flare occasioned by an electric shortage." On second thoughts, however, this may have been meant complimentarily; the occupants may have been using a less safe substitute.

Helping the Farmer

Activities in the S. W. & S. Area

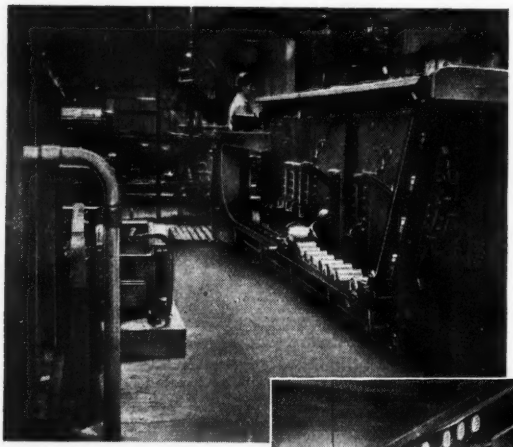
FACED with the ever-growing shortage of labour through the calling up of agricultural workers, farmers are becoming more and more anxious to take advantage of the assistance of electrical apparatus. Though themselves handicapped by labour difficulties and having to meet the more urgent needs of the armament industry, electricity supply undertakings are doing their utmost to help the agricultural community not only by maintaining their existing services but also by extending them whenever possible. Long extensions of lines are, of course, out of the question, but where farms are close to existing lines supplies are readily given. Further, under present supply conditions the electricity undertakings can generally assist the farmer by getting electrical apparatus installed and in operation considerably more quickly than is possible in the case of oil-driven equipment. This service to farmers and rural consumers is regarded generally by the Shropshire, Worcestershire and Staffordshire Electric Power Co., whose area we have visited recently, as a part of its contribution to the national war effort and also as part of the normal development of the large rural area over which it operates. Moreover, after the war it will help, at least in part, to take the place of the load of the armament industries and evacuated industrial, commercial and domestic consumers. Rural supplies are never likely to suffer from the same peaks and depressions as industrial loads, and in any case by the very nature of its supply area the company has definite responsibilities in respect of the development of the rural side.



Chopping up vegetables for pig food

The company's area of 4,000 sq. miles, stretching roughly from Banbury in the east almost to Cardigan Bay in the west and from Church Stretton and Bridgnorth in the north to the top of the Welsh valleys in the south, extends over ten counties, all of which are mainly rural in character. The varied nature of the area supplied, which ranges from the bleak mountains of Brecknockshire to the gentle, undulating meadow lands of Herefordshire and Worcestershire, has been responsible for the development of a diversity of

agricultural activities probably unequalled in any other area in the country. Dairy, cattle, sheep, poultry, corn, sugar beet, root crops, hop and fruit farming and market gardening are all to be found there, as well as innumerable industries of a non-agricultural character so diverse as flour mills, quarries, macadam and gravel works, sawmills, cider and mineral water works, canneries, brick and tile works, paper mills, sweet factories and collieries.



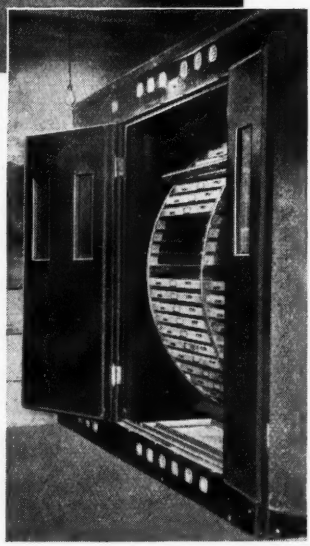
Fruit canning is one of the many rural industries served: above is seen a portion of the cooking line at the cannery of John E. Goodwin (Hereford), Ltd.

Under wartime conditions of shortage of labour and increased agricultural activity, farmers are of course only too anxious to obtain the assistance of electricity on their land, but this has not always been the case; in fact the farmer quite naturally prefers to see practical results before changing his own well-tried methods. In practice the company has found that the best form of publicity is a satisfied farmer and that progress in a rural community depends much on recommendation by one farmer to another. While this may mean slow initial progress there is no doubt that in the long run it will have a snowball effect, which should lead to satisfactory progress in the years to come.

While circulars and advertising through the usual media have been used to a limited extent in peacetime among the farming community, the company has found that such special features as lectures, often illustrated by lantern slides, at Farmers' Union meetings are the best means of telling the farmer how much he can gain by the proper use of electricity on the farm.

One of the most important factors in the successful development of agricultural load is good service and continuity of supply. It is not always realised that failure of supply, even though of comparatively short duration, can be very detrimental to the farmer. This applies particularly to such apparatus as milking machines and incubators. Good service should consist in not only overcoming failures of supply with the utmost dispatch, but also in quick service to any breakdown in the farmer's equipment. The advantage of such service cannot be over-emphasised.

An illustration of this type of service was given to us by the company's agricultural engineer, who told us that on one rare occasion when it was necessary for certain reasons to cut off the supply for some hours he spent the time at a poultry farm keeping up the temperature of some incubators by means of hurricane lamps and so succeeded in bringing £400 worth of eggs due for hatching-out safely through. Service does, in fact, count to a very large extent with farmers and many appliances have been sold as a result of the exceptional facilities provided. This applies especially to milking machinery and also to electric vehicles of which there are at least 130 in service, despite the generally unsuitable nature of the area for their operation.

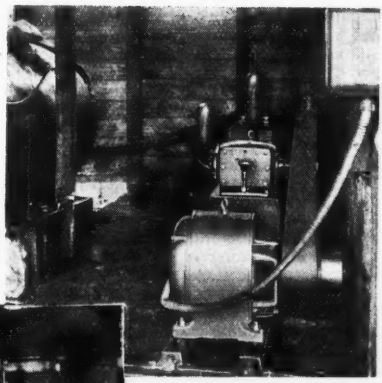


Hatcheries provide one of the best loads: a 20,000-egg incubator at Mr. John E. Goodwin's farm

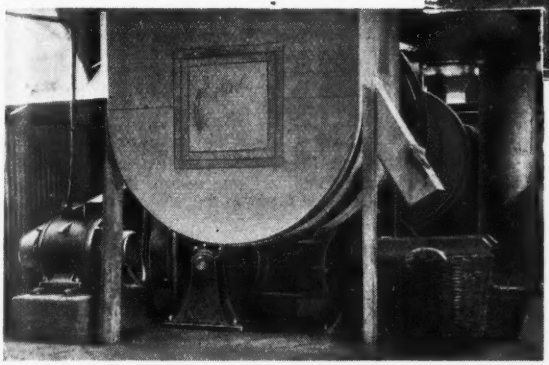
Good service also entails the best technical advice; while it is not possible in an area of the size of the S.W.& S. Company's to have enough

agricultural engineers to deal with every problem or make every technical member of the staff a fully qualified agricultural engineer, it is possible for members of the staff who come into contact with farmers to be provided with sufficient data on the service which electricity can supply on the farm to enable them to deal with most questions likely to arise.

In regard to tariffs the company finds that a farmer is not very impressed by the fact that he will require, say, a 1-HP motor to operate a milking machine or that a root pulper will use half a unit per hour. But tell him that with energy at 1d. per kWh he can milk a cow for ½d. to ¾d. a week, or pulp a ton of root for ½d.,



Almost every large farm has its own electrically driven water pumping plant



H. Weston & Sons' cider works at Much Marcle is one of several similar enterprises served by the S.W. & S. company; the rotary drying plant shown enables the residue of apple pulp remaining after the cider has been made to be utilised for pectin

and he knows where he stands and moreover the figures give a more convincing picture of the low cost.

With this in mind the company has provided all its staff coming into contact with farmers with statistics giving the cost of every service performed on the farm related to the actual work done. In addition, a handy schedule has been prepared giving the speeds of the various farm apparatus, together with a formula for finding the size and speed of pulleys.

On the domestic side of rural electrification it is the company's policy to make all its staff as "versatile" as possible. This is more or less inevitable when account is taken of the sparse population of the greater part of the area (particularly the western side) and the distance between consumers' premises—an especially important consideration in these days of petrol rationing.

As a result of its progressive policy of rural development the company has now succeeded in giving supplies to over 11,000 farms. It is by the way worth mentioning here that Hereford was one of the first areas in the country to have a rural grid scheme; this was inaugurated in 1921. Rural development on a large scale covering the S.W. & S. area as a whole was commenced in 1930.

Hop farms and grass-drying plants are regarded as providing the best load, since they consume on an average 6,000 to 7,000 kWh a year (some as much as 12,000 kWh)—all used in the summer when the load on the system is at its lowest. We hope to describe several of these installations which we visited in a later article.

An even larger consumption, though not so "off peak," is taken in normal times by hatcheries of which there are several having capacities for from 60,000 to 100,000 eggs. Consumption has, of course, fallen off as a result of present conditions, but some of the hatcheries are still fairly extensive. Dairy farms are found to provide the largest all-the-year-round load. Three-quarters of the farms supplied are taking advantage of a special farming tariff under which there is a fixed charge of 3s. 6d. per quarter for each 1,000 sq. ft. of floor area of closed farm buildings and a "unit" charge of 1d.

When supply is first available the domestic consumption of a farm frequently exceeds that utilised for agricultural purposes and the company is fully alive to the importance of building up the domestic load as the forerunner of further agricultural developments. So often is it found that farmers observing how useful and cheap electricity is in their homes, look round for other uses for it in their business activities. An attractive two-part tariff for

domestic purposes which has proved popular has a fixed charge of 3s. 6d. per room per quarter (2s. 6d. in urban districts) plus 1d. per kWh for the first 125 kWh per room per quarter and ¾d. above that amount (1d. for first 100 kWh and ¾d. respectively in the urban districts).

The company carries out the internal wiring and installation work required all over its area, and also supplies the equipment for the farmer, not only for his domestic use, but also for farming as well. Special attention has been focused on the use of the wash boiler, not only for its normal domestic purposes, but also for such other applications as providing hot water and steam for cleansing dairy utensils, pasteurising cream, bottling fruit, grooming cattle for shows, boiling small quantities of roots, steaming potatoes, soil sterilising, etc.

On the domestic side, too, the company is giving to consumers as near to its normal service as possible in these days of restricted supplies, and the farmer's wife who, after all, probably has a very large say in what electrical equipment is installed in her domain, cannot complain of lack of advice or assistance if she calls at any of the company's thirty-eight showrooms and "service centres." These service centres are recognised as food advice bureaux and in those which have demonstration kitchens, series of demonstrations are given, these being regular meetings of the Kitchen Front Clubs which were inaugurated in this area by the company.

From the remarks made to us by the farmers we visited (and whom, incidentally, we should like to thank for their kindness in permitting us to inspect their equipment) it is apparent that they are well satisfied with the services the company is rendering them and although we went to a large number of farms nowhere did we hear a word of criticism—and having visited many farms in our time we assure our readers that this is unique in our experience. In conclusion we should like to congratulate the company on its success and also to thank the members of the staff, particularly Mr. Harvey, for providing data for the preparation of this article.

The title illustration of this article shows a 50-kVA transformer supplying Capt. J. F. Bomford's 1,000-acre farm at Spring Hill, near Pershore, one of the most extensively electrified farms in the S.W. & S. area.

American War Activities

Countering Plant Shortage

LOAD factor improvement as a means of counterbalancing a probable generating plant shortage is occupying a good deal of attention in the United States. According to the *Electrical World*, one of the factors weighed by the Power Branch of the Office of Production Management in passing upon priority applications for new construction is whether existing connections with other systems are being utilised to the full limit of their availability. Consideration is also given to the extent to which proposed additions could be used to supply neighbouring regions.

Another way in which available power can be put to the best use is to transfer it from factories engaged in purely civilian production to war factories, or to convert the factories themselves to war production. The automobile industry is quoted as an outstanding example of the latter process.

It is announced that the whole of the American radio industry is to be devoted to war work. Already many electrical appliance factories have been switched over to the production of munitions.

Pacific Coast Black-out

Reference was made in our issue of February 6th to the difficulties experienced on the west coast of America when it became necessary to extinguish lighting. Matters are now improving in this respect. In San Francisco it was considered necessary to put a ban upon signs and decorative lighting, but the original ordinance has been modified. Now such lighting is permitted provided the circuits are manually controlled and someone is available to switch off within a few seconds of an alarm.

In Portland, Oregon, there has been a similar lifting of restrictions. Signs and other exterior lighting are allowed provided the users are prepared to black-out their premises within ten minutes' notice.

In the early stages it was necessary for the supply companies to cut off street lighting in the early evening. Now control circuits are being installed by which the lighting can be cut off from major substations.

Restrictions on Services

The extension of electricity, gas, water and telephone services to new users has been restricted in California. Utilities have been directed to furnish service to non-priority users in the following order:—(1) Connections not needing line extensions; (2) connections with the least material requirements; (3) connections which can be made within the "free footage" allowance of the line extension rules; (4) without approval no extensions can be made outside existing service areas or to new subdivisions prior to building therein.

Miss Haslett's Visit

The January 3rd issue of the *Electrical World* gave first place to an interview with Miss Caroline Haslett during her recent visit to the United States and reproduced her portrait on its front cover. Miss Haslett's main theme was the importance of maintaining "home front" morale. She also referred to the steps taken by supply authorities in this country to maintain and restore supplies during and after air raids and spoke of the way in which women were being trained for meter reading and testing, for the repair of appliances, etc.

The Installations Section

Mr. H. T. Young's Inaugural Address

IN the course of his inaugural address as Chairman of the Installations Section of the Institution of Electrical Engineers, delivered on Thursday last week, Mr. H. T. Young explained the scope and future of the new Section. He emphasised that it was not merely or mainly concerned with wiring installations. It had a very extensive field of study which might be summarily described as the utilisation of electricity, although it would not embrace communications or heavy electrical engineering such as that involved in traction and large industrial plant.

While its principal function at present was to contribute as fully as possible to the war effort, it was also to deal with electrical applications bearing upon the health, safety, comfort and convenience of the public. This involved the consideration of the basic question of the safety, adequacy and convenience of wiring installations. The I.E.E. Regulations had maintained a reasonably satisfactory standard of general efficiency; the time would seem to be near for making the Regulations legally effective. In this connection he paid a tribute to the work of the National Register of Electrical Installation Contractors.

In eliminating jerry building the Ministry of Works and Planning might decide to eliminate the jerry wireman as well. This would mean the preparation of simpler wiring regulations having legal effect. One or two inspectors in each supply area to "spot check" would provide an adequate stimulus towards compliance.

Stressing the essential safety of electricity the chairman quoted figures to show what a small proportion electrical accidents were of the total, although there were eight million wired homes, the annual sales of electricity were about 18,000 million kWh and the number of pieces of electrical apparatus giving satisfactory service was over 100 millions.

Wartime Expedients

The war had made it necessary to depart temporarily from normal standards for installation work on industrial premises. Mr. A. G. Ramsay of the Ministry of Works had already dealt with this matter, and in April another discussion on the subject would be opened by Mr. W. R. Watson of the Ministry of Aircraft Production. It was the desire of the Section to initiate papers and discussions on all matters concerning efficiency and economy in the prosecution of the war.

Referring to the inadequacy of the great majority of domestic electrical installations, Mr. Young considered that this could be prevented by giving wiring regulations the force of law. In this connection the carrying capacity of small cables might be examined. The last two editions of the I.E.E. Regulations had reduced the current rating of the smaller cables by assuming an ambient temperature of 90 deg. F. For domestic interiors it would be reasonable to adopt 70 deg., allowing for an upward grading.

The most appropriate way of associating capacity with wiring sizes would be to standardise suitable cables in sizes which could be produced economically in quantity. It seemed desirable in the national interest to investigate afresh without delay the whole problem of current-carrying capacity for industrial as well as domestic wiring.

Round-pin plugs had been standardised and the handicap of diverse designs would gradually disappear. There should be a determined attempt to minimise the use of flexible cords, especially in long lengths, and the general adoption of cartridge fuses would reduce inconvenience to consumers.

Ceiling Switches

Installations in large buildings presented a number of special problems, the principal one being the necessity for frequent alterations to the wiring. Circuits and metering could be re-arranged fairly easily but switch drops always seemed to be in the wrong place. One feasible solution was the adoption of ceiling switches as standard practice.

Builders were not too considerate of service equipment and in the years which lay ahead attention must be devoted to securing greater consideration. Discussions were taking place between the Ministry of Works and Planning and the Institution, and there was every indication that they would be consulted in regard to immediate and post-war developments in which they were qualified to advise.

Closer co-operation was being maintained between the three senior Institutions; there was a need to foster similar liaison between the electrical industry and the architectural profession and the building industry. The Electrical Development Association and the British Standards Institution had rendered assistance in this direction.

To indicate the scope for development Mr. Young said that in 1938 a total of £425 millions was expended on building work. Of this 7½ per cent., or £31,500,000 represented the value of electrical work, excluding radio, telephones and the addition of new apparatus. Including these, but excluding heavy plant, the total cost of all electrical installation work in 1938 could be reasonably put at £70 millions.

In post-war reconstruction there would be a call for electrical equipment for food production and storage, mining, housing, shipping and other transport. After the essential needs had been met electricity would play a part in the expansion which was being planned for education, recreation, and social and civic amenities. Among other specific avenues of development Mr. Young mentioned rapid transport between towns and airports; the lighting of subterranean buildings; fluorescent lighting; telephones and radio.

Future design of electrical equipment would involve an increasing use of aluminium and its alloys, plastics and other materials. Electrical engineers could aid in this development by adjusting their ideas of form and construction to suit the new materials and, above all, to secure the maximum simplification and standardisation. In this connection the advice of women interested in electrical development would be helpful; the E.A.W. would, he was sure, continue to render valuable service to both the user and the industry.

Mr. Young said that while the minds of engineers should be directed towards reconstruction after the war, the immediate and vital concern was to complete the war organisation necessary to achieve victory. Therefore planning for post-war reconstruction should be delegated to as few persons as possible at the present time; more complete machinery could be put into operation when the occasion arose.

In conclusion the chairman hoped that each Local Centre would soon establish an Installations Section Committee of its own.

The Board's Future

DURING the recent debate in the House of Lords on production, Lord Beaverbrook, the new Minister of Production, said that Col. Llewellin, the new President of the Board of Trade, would be in charge of the production of oil, coal and electricity.

Lord Barnby (a member of the Central Electricity Board) asked for an amplification of this statement. What, he said, was the position of electricity and of the Central Electricity Board? The White Paper on Production stated that "the Minister of Production will concert and provide for the needs of the production programmes for which the Board of Trade is responsible, in particular, electricity." The contribution of the Central Electricity Board to the war had been outstanding; it was probably the most successful of the defensive precautions with which we faced the war. Had it not been for the grid system our position might have been precarious. We did not want to see the Board now become a sort of medicine ball for physical exercises between different Ministers. It had recently been passed from the Ministry of War Transport back to the Board of Trade, and to pass it back in another way now would be extremely disquieting. When it came under the Board of Trade it fortunately passed under the administration of Sir Andrew Duncan, who, in addition to his great knowledge of coal, brought to the problem his experience of the interpretation of the Act in relation to the grid and the standardisation of frequency.

Lord Beaverbrook said that electricity was the responsibility of the President of the Board of Trade. It was his (Lord Beaverbrook's) duty to deal with the allocation of electricity, but of course these were matters relating to production and rightly the control was vested in the President of the Board of Trade.

Lord Barnby.—May I ask whether the responsibility in regard to the Electricity Board and the Electricity Commissioners remain with the Board of Trade?

Lord Beaverbrook said that that would be an issue for the President of the Board of Trade. He was not concerned with the operation at all. As a Minister he was avoiding operational responsibility as far as possible: in fact he hoped altogether. Therefore the noble lord's question would have to be addressed to the President of the Board of Trade. He did not think, though, that he had any intention to change the present arrangements, which seemed very good.

Factory Lighting

THE Select Committee on National Expenditure in its 21st Report drew attention to the unsatisfactory state of the lighting in factories, especially in the smaller ones, stating that the cost of improving it might be far outweighed by the increase in output.

The whole resources of the electrical industry, through the National Industrial Electric Lighting Service, have been placed at the disposal of factory executives to enable them to comply with Government legislation, but the situation as regards labour and materials has now made it necessary to recognise that as a temporary measure future lighting revisions should be largely restricted to those factory areas where the lighting is seriously below standard. Rather than make wholesale alterations, factory managements, who it is felt have by now had sufficient experience of war-time production, will be asked to decide in consultation with a qualified lighting engineer, which areas in their factory will show most direct results from improved lighting.

All improvements should for the time being be limited to those working areas where the existing illumination falls below the compulsory minimum standard required under the Factories (Standards of Lighting) Regulations (6 ft.-candles or 2 ft.-candles, as applicable) or the existing illumination is less than 50 per cent. of the mean value of the I.E.S. Code range of illumination applicable to the class of work, whichever is greater, unless (*a*) there is reason to believe that production would be substantially improved by higher levels of illumination; (*b*) the existing lighting has given rise to serious complaints by workers; or (*c*) the existing equipment is obsolete in character and gives rise to serious glare or troublesome shadows. In such cases, the mean of the appropriate I.E.S. Code range should be adopted as the basis for designing improvements to the installations.

It is emphasised that the scaling down recommended is an expedient to meet the present situation, without prejudice to the future adoption of full I.E.S. Code levels over all working areas.

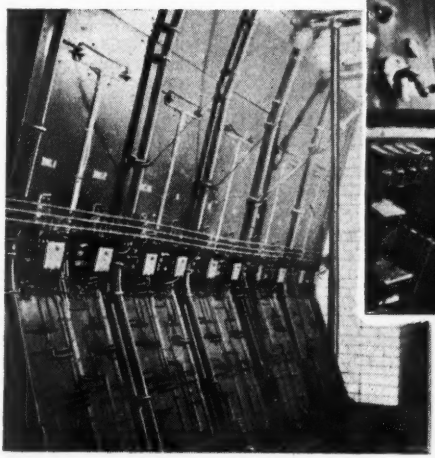
Bomb Damage

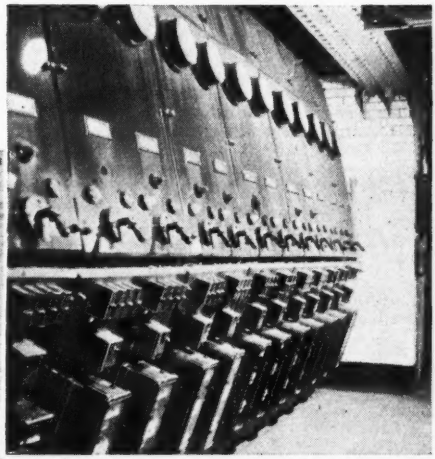
Examples of Supply System "Incidents"

SINCE November when we published two articles on air-raid damage and methods of dealing with it we have had an opportunity of visiting several more electricity undertakings whose areas have suffered severely. While the experiences of the electrical engineers responsible for operating these undertakings are in general similar to those already described, several further interesting and instructive facts have been brought to our notice which make it well worth while for us to return to the subject.

Turning first to the question of damage sustained, we find general confirmation of the small amount of harm caused to generating and substation plant. Where damage *has* occurred dislocation of supply has rarely been serious and restoration of services, thanks to alternative sources of supply and switching arrangements, has usually been a matter of minutes or at the most hours.

As an indication of the amount of maltreatment substation equipment can withstand from high-explosive bombs, the accompanying illustrations show how a switchboard was blown right out by blast





Although this control board was blown out by blast, as shown, there was practically no damage, and the apparatus was speedily put into commission again

but needed only minor repairs to the wiring. On another occasion a 750-lb. bomb fell only three or four yards from a 15,000-kVA B.E.T. transformer, while a further large outdoor transformer had its cooling tubes pierced at their lowest point by bomb splinters, the entire oil contents draining away : in both these cases the apparatus continued to function.

At another static substation a large bomb almost dived under the substation floor after striking the road outside, splitting the floor into four almost complete sections. Each of these contained plant and was raised about a foot, remaining at an entirely different angle from its neighbour. The 6.6-kV cubicle switchgear was at an angle of 15 deg. at least to the normal horizontal plane, with many insulators cracked and broken, all the trifurcating cable-box supporting lugs torn away, and the feeders left hanging by their "tails." The transformers were moved 2 ft. out of position and lay taut on their cables, while the low-voltage floor-mounted switch-fuse gear was flat on its back with all the cable plumbing cracked. The roof was distributed amongst the plant, but the supply was still maintaining its 50-cycle frequency.

In a similar case the front wall of a substation was forced in, the tiles were blown off the roof and the concrete floor was badly cracked: yet the apparatus inside was unscathed. Incidentally, the method of repair adopted in this case is interesting, the roof

being jacked up, new walls built, and the roof lowered again.

On yet another occasion, typical of many, the foundations of a substation housing two rotary convertors were displaced several inches. The apparatus mounted on it, however, was not harmed and remained in service, the only repair work necessary being the making good of the foundations and the shoring up of the walls. The placing of sheet steel protective covering over rotary convertors, switchboards, etc., is, of course, now common practice among supply undertakings.

With regard to damaged roof tiling, some engineers are considering it worth while to replace the tiles by a substantial concrete roofing which besides being less affected by blast has the additional merit of being a good protection against fire bombs. This also solves the problem of making a considerable number of buildings weatherproof when there is only a limited number of tarpaulins with which to do it.

We have also been told of one undertaking which is utilising spare cable tiles (or ordinary bricks) interlocked with wire stirrups for the flat lead roofs and gulleys of substation and other buildings as a protection against incendiary bombs. Small spaces are left between the tiles to allow rainwater to run away. Another safeguard against incendiaries employed by the same undertaking in slate roofed buildings is the placing of iron sheeting above the 2 in. of sand which is recommended for covering the rafters or flooring immediately below the roof. This sheeting absorbs the impact of the bombs which otherwise has a tendency to disturb the sand.

In actual fact substations and the plant housed in them appear to suffer surprisingly little damage from fire, and it is no uncommon occurrence to find that they are the only part surviving of buildings destroyed by this means. Ideas, too, are being rapidly revised as to the danger of fire to transformers. Instances are recorded of their having been charred, their insulation burnt off underneath, their oil boiling and even actually burning, and their connecting cables being burnt off to stumps at the point of entry, but in each of these cases the apparatus has been salvageable. Salvaging is, however, not always a straightforward matter since apparatus, particularly that in substations on consumers' premises, is often buried underneath debris and even if it has escaped serious harm itself, access to it is impossible at any rate for some time.

Robust Rectifiers

The way in which glass bulb rectifiers stand up to damage has been commented on before, but the following incidents give a good idea of the sort of treatment they will withstand. A heavy bomb fell close to the side wall of a substation containing a 500-kW, 6.6-kV to 460-V DC glass-bulb rectifier equipment, step-down transformers and low-voltage metalclad switchgear. At first sight the prospect looked hopeless. The substation was nearly roofless and quite windowless and doorless. But the supply was still on. When the internal debris had been cleared away sufficiently to examine the plant it was found that the entire rectifier equipment, rectifier, transformer, bulbs, cables and all accessories, had been moved at least 6 in.

One bulb it is true was destroyed, but it had successfully cleared its AC and DC protection. The remaining three bulbs were unharmed and complete automatic control remained. The automatic voltage regulation still functioned precisely according to I.E.E. Regulations.

Despite the severe manner in which some of these feeders were twisted in no case did a breakdown occur

The *pièce de résistance* was, however, to be found in another rectifier substation where a 12 ft. by 9 in. by 3 in. wooden roof principal had gently but definitely come to rest on the dome of the condensing chamber of a glass-bulb rectifier which still remained on load.

It is obviously not possible on account of the limited personnel available to have fire watchers provided by the supply undertakings at every substation, but special provisions are usually made to have men on duty at the more important ones. The minor ones can be left fairly safely to the care of members of the staff who happen to live in the district, to the wardens, and to the Fire Service.

Even before the war undertakings generally had been very active in providing alternative sources of supply and alternative switching arrangements, and a carefully planned distribution system has been the salvation of many an undertaking. The importance of splitting up the supply area into as many sections as possible was stressed in our previous articles; it is much safer to have several small substations than one large one. This process of decentralisation and reorganisation is still continuing so as to render serious dislocation of supplies even less likely, and following the motto "Be prepared for the worst" new substations are being erected and new cables laid to serve key points.

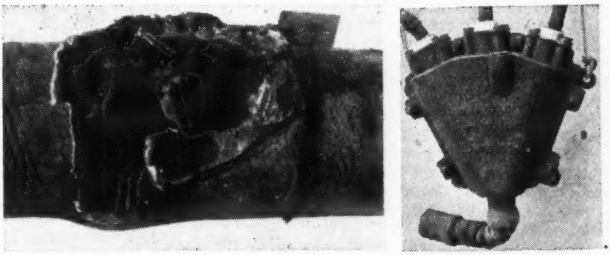
The speed with which some of this work is being carried out is interesting. On one occasion, for instance, after a severe raid a complete 1,000-kVA temporary substation—not required as it happened, but nevertheless ready in case it was—was completed in ten days.

Damage to cables has inevitably provided by far the largest source of instructive facts and problems. Though, despite the most severe stretching, twisting, bending and flattening the cables frequently remain in service, it cannot be taken for granted that an apparently sound length is unharmed. In many cases steel armouring has been found to have saved cables from damage, but it is advisable to pressure-test from at least the draw-boxes on either side of the crater. Sometimes damage is caused to cable joints by vibration from nearby bombs, resulting in water entry. Often, too, although no harm is done to the main cables, the pilots are damaged. This frequently leads to a failure of the earth-leakage system. When the cables are moved by means of a rope perhaps nothing happens, but as soon as the men start working in the crater the cables "go up." Some engineers now cut the cables on each side of a crater as a matter of course.

Separation of Cables

A single h.e. bomb is capable of putting out of commission the whole of the cables entering or leaving a substation unless the precaution is taken of using several points of entry and exit to avoid bottlenecks. On the other hand, it is seldom, if ever, found that a h.e. bomb damages cables laid on both sides of the road; this gives a good idea of the distance necessary to separate mains in order to be fairly sure that at least one of them will remain uninjured.

Where a building is gutted cables also are almost certain to be burnt out to the point of entry and recabling is necessary to restore supply. If, however, a building is damaged by h.e. bombs, this is not the case and probably little or no repair work is required. Remarkable instances are reported of cables remaining alive after almost unbelievable damage. In one of the illustrations a 6.6-kV, 3-core, 0.25 sq. in. cable cut by a bomb splinter is shown. This remained in service for a fortnight lying under debris without breaking down in spite of severe damage. The trifurcating box in the other picture also remained on load for 1½ hours despite the fractured lead below the plumb and the exposed paper covering.



Though severely damaged by a bomb splinter, the 6.6-kV, 3-core, 0.25 sq. in. cable on the left remained in service for a fortnight lying under debris without breakdown. The trifurcating box on the right remained on load on a 6.6-kV system for 1½ hours until made dead, despite injuries to the entering cable

An indication of the depth of penetration that may be expected with some types of h.e. bombs is provided by a chance hit on a 33-kV, 0.18 sq. in. submarine cable passing across a river mouth. This was damaged although the cable was some feet below the river bed and although the water at the spot in question was several feet deep.

Though it was not caused by a bomb but by a stray anti-aircraft shell, another incident is worth recording. The shell entered the ground at an angle of 45 deg. between two sleepers of a sleeper road under which 33-kV unarmoured cables were installed, severing two and damaging a third. It was then deflected upwards out of the ground over the roof of a high building and finally it fell to earth about 100 yd. from the scene of the damage. The fault developed so rapidly that before the earth-leakage protection had opened the circuit the fault had developed to one between phases, causing a depression of the busbar voltage. From this it was possible to deduce that the fault had been caused by some object, in all probability either an unexploded bomb or anti-aircraft shell, that had fallen on the site.

In our next issue we propose to continue this article by giving further details of methods adopted in restoring supplies.

Electrical Research

Annual E.R.A. Meeting and Luncheon

ALL motions were carried unanimously without discussion at the very formal annual general meeting of the British Electrical and Allied Industries Research Association in London on February 13th, the attendance being quite small.

The chairman of the Council, Mr. C. W. Marshall (Central Electricity Board), presided and prefaced his proposal of the adoption of the report for the year ended September, 1941 (see ELECTRICAL REVIEW, January 16th, 1942), with an explanation that maintenance of the Association in full activity did not mean that it had been practicable to continue the normal programme, which had in fact been considerably retarded; but the situation was not one for which he need make excuses, since it resulted from the devotion to war work of a considerable proportion of the Association's staff and facilities.

Application of scientific knowledge in its broadest aspects to the war effort, increasingly advocated recently, together with post-war scope for research, rendered it essential that the potentialities of the E.R.A. should be realised and fully utilised. It was equipped for almost every type of electrical testing and had intimate associations with all manufacturers, and most of the academic electrical research centres. The chairman therefore suggested that the E.R.A. might well be the clearing house for all major electro-technical problems which confronted both civil and military authorities.

Luncheon Speeches

Viscount Falmouth, M.I.Mech.E., Companion I.E.E., who had been elected president in succession to the late Lord Stamp, presided at the subsequent luncheon at the Savoy Hotel, which was well attended though not so largely as in pre-war years.

Sir Noel Ashbridge exercised the long-standing privilege of the president of the Institution of Electrical Engineers of proposing the toast of "The E.R.A.," expressing hearty congratulations on its record of the past twenty-one years. He said that it was the outstanding example of co-operative research in this country, a fact which those responsible for drawing up plans for future work would do well to note. Sir Noel spoke especially appreciatively of the director, Mr. E. B. Wedmore, and his staff, remarking that all who knew what it was to have their work directed by committees would also know what tact was demanded and the high degree of skill needed to make such work effective.

Viscount Falmouth, in responding, explained that he had for some years past been closely connected with the research association movement; indeed he had only just completed his term of office as a member of the Council of the Department of Scientific and Industrial Research, which looked upon the E.R.A. as one of its "prize boys." In certain industries he thought there was much to be said for relatively small independent units, always provided they were well conducted, for they certainly provided greater opportunities for individuality, which was a valuable asset. But small undertakings were usually handicapped by inability to afford expensive research organisations; whereas co-operative investigation financed collectively and assisted by effective Government grants (not involving Treasury control in the electrical case) put at their disposal that which individually they could not hope to achieve.

Tax Concession

Apart from its main object of problem solution in the laboratory, the research association movement had another value in respect of difficulties in British industry that had too often arisen in the past from the individualism they had quite rightly prized, for what should be healthy competition had been known to deteriorate into internecine war between component sections of an industry. Such a tendency could be corrected by co-operative research.

Not so long ago this country almost monopolised scientific research and technical developments. Some people indeed thought it was in a position of permanent superiority; a nation set aside, as it were, to hand out the fruits of discoveries to others less fortunately situated. All that had now changed; science was recognised as universal, it knew no frontiers, and only by a very vigorous policy of applied research could this country hope to keep ahead of others almost as well situated as itself. And so it was most encouraging to know of a very important concession by the taxation authorities, which permitted firms to include in their allowable expenses their donations to their research associations.

Immense destruction was taking place all over the world; huge debts were piling up and after the war all would be much poorer than before. Foreign markets would be in a state of chaos, taxation very high, and the finding of work terribly difficult. Only the most efficient industries would be able to survive, and research associations would be one of the most important factors in building up that efficiency.

The final toast, the health of the president, was proposed by Mr. C. W. Marshall.

Supervisors' Association

Speeches at Annual Luncheon

ABOUT 400 attended the luncheon given by the Association of Supervising Electrical Engineers on February 14th at the Connaught Rooms, W.C. Mr. H. W. Swann, now serving his third term as president, referred to the many distinguished guests present. Apart from those on the toast list, these included Lord Falmouth (President E.R.A.), Mr. W. A. Stanier (President I.Mech.E.), Col. A. W. Garrett (Chief Inspector of Factories), Messrs. W. K. Brasher (Secretary, I.E.E.), A. C. Cramb (Director, E.D.A.), W. J. Jones (Director, E.L.M.A.), H. M. Winstanley, H. T. Young and L. C. Penwill (Director, E.C.A.), Dr. A. K. Thurston, Mr. P. W. Cole and five past-presidents of the Association, *viz.*, Messrs. J. R. Beard, S. B. Donkin and A. H. Dykes, Sir Frank Gill, and Mr. J. M. Kennedy. Mr. Swann expressed the hope that codes for wartime practice would pay attention to the competence of men whose duty it was to install, maintain and operate electrical apparatus.

Responding on behalf of the guests, Mr. H. E. C. Beaver said that codes of building practice initiated by the Ministry of Works and Planning (of which he is director-general) would prescribe voluntary minimum standards of good practice, after securing agreement by the technical bodies most concerned, as in the case of B.S. Specifications. The Committee of the Ministry would have a permanent chairman and staff who would decide whether any particular code was necessary or needed revision, the drafting of each code being left to an *ad hoc* committee of one of the constituent bodies. Outside views would be heard before the recommendations were published as an agreed code. Ultimately perhaps a compulsory building code might be instituted.

In proposing the toast of "The Electrical Industry," Mr. A. G. Ramsey claimed that it was among the first to set up research organisations and these had done much to break down opposition to new departures and to link up the laboratory with practical applications.

"Winning the Peace"

Sir Noel Ashbridge (President I.E.E.), who responded, said that the electrical industry had more quickly adapted itself to war conditions than most others and had been able consistently to supply necessary electrical apparatus as well as munitions. It had enormous potentialities in regard to "winning the peace," which would mean making a tremendous positive effort in reconstruction. Many ideas on special points were forthcoming, but these would have to be co-ordinated and "boiled down" by central bodies such as the I.E.E. Post-War Planning Committee. A large number of posts for war work had been filled through the I.E.E. Register, but there had not been enough telecommunication engineers. He deprecated the common separation between light and heavy-current men and recommended more frequent changes from one branch to the other, since specialisation for life was not always a good thing.

The Skilled Man's Needs

Brigadier F. T. Chapman, proposing the toast of "The Association," recalled that about fourteen years ago he had discussed the Association's apprenticeship scheme with its secretary, Mr. A. Brammer. Four qualities, he said, were needed in a skilled man, *viz.*, knowledge of the technique of his craft (a method of doing), knowledge of general elementary technology (which could be obtained from schools and books), knowledge of the technology of the equipment he had to maintain, and judgment in regard to his work. The last, by no means the least important, could only be acquired through personal experience. Help from others could only take the form of providing opportunities for gaining experience, in which frequency of incidents rather than length of time was the essential thing. Time for reflection in order to absorb experiences was also necessary.

Of the total army personnel, more than one-tenth was occupied in the maintenance of engineering equipment. These men, unlike those in industry, were not kept busy with a steady flow of orders and the co-operation of industry was needed to give soldiers practical experience, as well as of technical colleges to furnish instruction. After the war he hoped apprenticeship schemes would be run jointly by the Board of Education and industry.

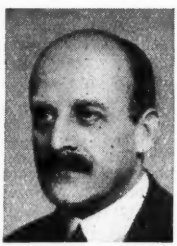
In his response, Mr. S. G. Christian (Chairman, A.S.E.E.), observed that if the scheme of apprenticeship drawn up by the Association in 1928 had received the favourable consideration it deserved, the position regarding skilled men would have been better to-day. The Association had always endeavoured to ensure that the experience and energy of competent electrical engineers should be used for the good of the industry and of the nation, but it had not hesitated to ask that remuneration should be adequate. Through its register the Association had helped to place many hundreds of engineers in positions of national importance. The lectures and other activities of the Association were being carried on most successfully and five new branches had been formed since the outbreak of the war.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE General Electric Co., Ltd., announces that **Dr. A. H. Railing,** joint general manager with Mr. L. C. Gamage, has been appointed vice-chairman of the company in the place of the late Mr. M. J. Railing.

Dr. Railing joined the G.E.C. in 1905 as chief of the test department at the company's Witton works, after several years of experience in production and management in the United States and on the Continent. In 1907 he was transferred to London as technical assistant to Lord Hirst and four years later was elected to the board and appointed general manager of the Witton group of works. He returned to London in 1933 to take over additional administrative duties. Dr. Railing has been vice-president of the I.E.E. and a member of the management board of the Engineering Employers' Federation.



Dr. A. H. Railing

The D.F.C. has been awarded to **Lieut. H. M. Ellis,** who is the elder twin son of Mr. H. Ellis, general manager of the West Gloucester Power Co.

Mr. N. F. W. Jeffcoat, foreman electrician with the Shropshire, Worcestershire and Staffordshire Electric Power Co., was married on February 5th, at Banbury, to Miss Marjorie Winifred Lloyd, who is the company's chief showroom attendant at Banbury. The staff and employees have presented them with a nest of tables in polished oak.

Miss Marjorie Topple, demonstrator with the Derby Corporation Electricity Department, has won the Elizabeth Sloan Chesser Cup, which is awarded each year to the candidate obtaining the highest marks in the diploma tests of the Electrical Association for Women. The cup was presented to Miss Topple on January 20th by the Mayor of Derby (Alderman H. G. Pattison). Under Miss Topple's tuition the pupils of the Derby Parkfield Cedars School have won for the second consecutive year the Councillor Walters Rosebowl Trophy for the E.A.W. Electrical Housecraft Diploma for Schools.

Dr. J. B. Whitehead has been awarded the Edison Medal for 1941, by the American Institute of Electrical Engineers " for his contributions in the field of electrical engineering, his pioneering and development in the field of dielectric research, and his achievements in the advancement of engineering education." The *Electrical World* states that Dr. Whitehead's chief professional interest over many years has been in experimental research. While he has been identified chiefly with education and research, he has also engaged actively in practice as consulting engineer. He joined the teaching staff of Johns Hopkins in 1904, and when the School of Engineering was established in 1912, he was largely responsible for its planning and organisation and for the selection of the new faculty. He became Professor of Electrical Engineering in the new school, Dean in 1919 and Director in 1938. His consulting work has included work for the Baltimore & Annapolis Short-Line Railroad during its electrification and he has had an extensive practice in the high-voltage insulation field.

Mr. James Gray, chairman and managing director of the Electric Construction Co., Ltd., with which he has been associated for forty-nine years, has intimated that he will retire from the board on March 31st.

Lord Greenwood has been appointed a director of the Brazilian Traction, Light & Power Co.

Mr. R. J. Howley, deputy chairman of the British Electric Traction Co., has been appointed chairman of the company in succession to the late Mr. J. S. Austen.

Obituary

Mr. A. J. Hedgcock.—We regret to record the death on February 13th of Mr. A. J. Hedgcock who, during thirty-two years' service with W. T. Henley's Telegraph Works Co., Ltd., carried out many outstanding electrical contracts. He retired from his position as chief engineer of the company's Contract Department on December 31st, 1935. Mr. Hedgcock served a six-year apprenticeship at Portsmouth Dockyard in naval engineering, both ashore and afloat. He spent two years in the Electrical Department fitting out H.M. ships with lighting, power and fire control. One of his most interesting experiences during this period was the erection of the electric launching gear for the battleship Royal Arthur in 1889.

On leaving the Dockyard, Mr. Hedgcock joined the Silvertown Co. and installed for them the complete electrical equipment in three cruisers built by the Thames Iron Works at the Victoria Docks—Blenheim, Grafton and Theseus. In 1892 he joined the City of London Electric Light Co. and in 1893 he installed the City of London's first lead-covered, paper-insulated cable.

Mr. Hedgcock joined Henley's in 1904 and during his long and varied service was responsible for such outstanding contracts as the high-voltage cable work for the London United Tramways (the biggest undertaking of its kind), the electrification of the Central Argentine and Buenos Aires Pacific Railways, the installation of a 33,000-V, 3-core cable for the Commonwealth Edison Co. in Chicago, in 1924, and the laying of the telephone cables from Port Said to Suez for the Eastern Telegraph Co. The funeral was at Reigate on February 16th.

Mr. Matt Jennison, whose death occurred on January 27th, was for many years the proprietor of Matt Jennison, Ltd., electrical, mechanical and automobile engineers, Grimsby. Mr. Jennison served his apprenticeship at P. R.

Jackson's Rolling Mills, Salford, subsequently joining the machine testing staff of Cromptons, Chelmsford. Mr. Jennison was also known as an expert in automobile engineering. He leaves a widow and one daughter.

Mr. Alexander Tullis, aged sixty-two, manager of the British Arc Welding Co. (North East Coast), Ltd., has died at his home in South Shields.

The **Earl of Midleton** has died at Godalming at the age of eighty-six. He was deputy-governor of Cable & Wireless (Holding), Ltd., chairman of the Globe Telegraph & Trust Co. and a director of Cable & Wireless, Ltd., and Marconi's Wireless Telegraph Co., Ltd.

Mr. W. A. Crowther, a director of the Yorkshire Electric Power Co. and the North Lincolnshire & Howdenshire Electricity Co., has died at Huddersfield at the age of sixty-four. Mr. Crowther was also Deputy Wool Controller.

Mr. R. J. Browne.—The death has occurred at Crieff (Perthshire) of Mr. Robert J. Browne, M.I.E.E., for many years electrical adviser to the Government of Bengal. He retired in 1926.

Mr. Alfred Alcock, founder and principal of Alfred Alcock & Son, electrical factors, of Rotherham, died on February 5th at the age of sixty-five.

Mr. S. T. Heskings, of Merz & McLellan, who was formerly with T. Clarke & Co., Ltd., and the Springvale Electrical Co., died this week. Mr. Heskings was well known to London electrical contractors. His funeral is taking place to-day (Friday).

INSTITUTION PROCEEDINGS

Derivation of Lac.

Glass-bottle Annealing

REFERENCE was made last week to the paper on this subject by Mr. E. S. Morriss (United Glass Bottle Manufacturers, Ltd.) which was read before the Installations Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 12th.

The discussion on the paper was opened by Mr. P. M. Hogg (Pilkington Bros., Ltd.), who said he imagined that the life of the electric lehr heating elements was very long because the conditions were not very severe. The annual load factor of the modern glass bottle works was between 65 and 70 per cent. Why had the author based the cost for 24 hours a day on the loading? The average load in some cases was very much lower. The electric lehr should have been compared with a modern gas or oil-fired lehr, in which case the relative costs would have been closer than was suggested; for an oil-fired lehr the cost would probably be about one quarter of that given by the author. From the glassmaking point of view it was simply ideal to use the heat of the cooling bottles to heat the mattress on its return journey to the hot end of the lehr. Had the author considered variable voltage control, more especially for the annealing lehr in which something like 75 kW was switched on and off?

Dr. E. J. Gooding (Rockware Glass Syndicate) said that there had been no sudden jump from the oil or gas-fired lehr to the electric lehr. Actually, the electric lehr was preceded by the muffle type of lehr which was still extensively used in the glass industry. He queried whether electric heating could be said to be necessarily superior to gas or oil, except for annealing. The electric lehr was up against something more than the old brick lehr.

In one with which he was particularly concerned he had used nichrome wire heaters,

Lighting Problems.

but found failures more frequent than desirable; bare strip heaters had been satisfactory even in a sulphur atmosphere, but the junctions had to be made very carefully. In actual cost of heat units put into the lehrs, the old orthodox oil-fired muffle lehr was more economical to run than an electric lehr. Did the author employ any auxiliary electrical heating in bringing up the lehr from cold? Maximum demand was another difficulty against which the electric lehr had to contend.

Mr. V. O. Cutts (General Electric Co., Ltd.), after commenting on the advantage to the manufacturers in having a specialist like the author to collaborate with them, said that the design and construction of lehrs depended upon uniform temperature distribution in the heating and cooling sections, and on precise temperature control, which favoured electricity. The author appeared to be using an embedded heating element; why did he prefer that to the use of a robust nichrome strip? In the electric furnace it was possible to get any artificial atmosphere desired.

Position of Elements

Why were the elements of the author's lehr placed as described? Was there any advantage as compared with top and bottom elements? Some information as to the life of the conveyors and the amount of stretch would be useful. Electric lehrs were being made portable without any difficulty.

Mr. J. E. Oram (Wild-Barfield) emphasised that the superior quality of the product of an electric lehr easily counter-balanced the extra cost of the heat units. He thought that a more uniform temperature would be obtained with the elements at the top and bottom in view of the relatively wide belt compared with the height of the chamber.

Mr. J. Plummer asked for information about the cost of any particular type of lehr, including

the cost of development work. Mr. H. L. Crook, a colleague of the author, speaking with regard to the relative cost of fuel, said that electricity at ½d. per kWh cost about 1s. 2d. per therm, oil 4d. to 6d. per therm at present prices, and gas from 5d. to 10d. The higher cost of electricity was not very alarming. Gas was normally burned at 50 per cent. efficiency so that gas at 6d. per therm was really costing 1s. per therm or more. In the case of electricity all the heat was used in the chamber in which it was put and it had advantages with regard to convenience and control. With electricity the lehrs could be shut down for the week-end and easily started again on Monday morning.

Author's Reply

In the course of his reply to the discussion, the author said that elements stood up to the conditions in his own case for five or six years. The particular control used with the enamelling lehr was very sensitive and they could bring the whole 75 kW in on the contactor, as there was a very large load on the factories which necessitated running large compressors. He had compared the brick lehr with the modern electric lehr in order to show the development he himself had been particularly interested in. Even if the electricity was on for 24 hours, the cost would still be lower than with oil or gas for comparative loads. In bringing up the lehrs from cold he used gas, but not under the mattress because the cost of a mattress at the moment was colossal. The elements were housed in refractory material to protect the operators who used a metal fork to handle the bottles in the furnace. No attempt was made to put heating elements in the crown of the lehr because that was the weakest part of the structure. For the protection of the elements there was an automatic regulator which operated within 2 or 3 degrees. The stretch on the mattress was 5 or 6 in. at the start but when the lehr was heated up it was practically constant. As time went on it was necessary to take up the stretch a little.

The Story of Lac

WITH the above title, a paper submitted to the Indian and Burma Section of the ROYAL SOCIETY OF ARTS in London on February 13th indicated how modern research is adding to the already numerous uses in many industries of this unique material, some 30,000 tons of which is sent annually from India to many parts of the world, about half going to America. It is practically a monopoly of India; it has been known for many centuries past and has a literature that has reached large dimensions. Yet there is much popular misconception about the substances according to the author of the paper, Mr. A. J. Gibson (London Shellac Research Bureau).

Shellac, as the raw material is often popularly but erroneously known, differs in properties from other natural resins and is unique also in being the only known resin of animal origin. It is a metabolic product of the small insect *laccifer lacca* belonging to the Coccidæ family, less than one-twentieth of an inch long, soft-bodied and feebly motile, with a life cycle of from four to six months. It feeds on the sap of its host tree by means of a hair-like proboscis inserted through the thin bark of twigs and produces therefrom a protective covering, which is sticklac resin.

The author described its cultivation and manufacture in a running commentary on a cinema film, and with the aid of exhibits of the principal lac products, both raw and made up. More than half of the total supply is used in gramophone record making. After a brief historical account the author said that a direct synthesis of lac by chemical means was not likely to succeed. When he was in Berlin in 1932 he saw a sample of synthetic lac that Dr. Werner Nagel (Siemens-Schuckert) had built up from its component acids, as then known, which was jokingly priced at 1,000 marks per kilogramme, at the pre-war rate of exchange representing £80,000 per ton!

Heat Rationing

SPEAKING at a meeting of the Scottish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS recently on "Conservation of National Fuel Resources," Mr. J. S. Pickles, county electrical engineer of Dumfries, referred to the possibility of the domestic use of fuel being controlled after the war. In this connection, he said, it was interesting to note that a proposal had already been made in recent months that heat should be rationed. They had only just escaped by the skin of their teeth from this plan which was put forward by the Mines Department. The plan was that heat units, involving paraffin, coal, electricity and gas, should be rationed. It was proposed that there should be a number of "heat coupons" issued for every householder in the country. The Mines Department was very keen about the idea, and it took a bit to convince them that it was impracticable.

Office Lighting

THE adequate lighting of office buildings was the subject of a paper, illustrated with many lantern slides, which Mr. J. B. Harris presented to the Bath Section of the ILLUMINATING ENGINEERING SOCIETY on February 11th. Since the subject had not been officially recognised like factory illumination, the author first suggested that electrical contractors and makers of lamps and fittings should commence a drive to make lighting in all offices comparable with that being provided in industrial establishments.

He then turned to types of installation, indicating intensities appropriate to different

kinds of office work and mentioning various existing designs of fittings for diffusing light. Incidental reference was made to the importance of ensuring that pearl, not clear, lamps were used in diffusing fittings in order to avoid causing a bright wavy line called striation which appeared on the external surface, as well as reflected glare that frequently occurred due to glossy walls and ceilings.

Another fact not often appreciated was that to obtain even illumination there must be a fixed ratio between spacing and mounting heights, depending upon the polar curves of the fittings. The planning of light did not consist merely in arranging fittings according to various personal whims. Local sources of the desk lamp type were not generally advocated, due to eye fatigue caused by excessive brightness contrast between working and surrounding areas.

The provision of artificial daylight was often advocated on the ground that it caused less eye strain. While the wisdom of this precaution could not be doubted, unfortunately light of that spectral quality could not be produced economically, apart from the use of 5 ft. fluorescent mercury-vapour tubes. For reasons of eye comfort it was preferable when installing bare lamps of this type to mount them at right angles to the long axis of the desks. They could be hung directly overhead in offices with ceiling heights as low as 7 ft.

Much improvement could be effected in the design of modern fittings to enable them to be more easily removed for maintenance.

Lighting Problems

ILLUMINATING engineering problems associated with the war, or post-war developments, were discussed by the ILLUMINATING ENGINEERING SOCIETY in London on February 10th. Among the several contributions presented was one by Mr. M. W. Peirce on the positioning of fluorescent tubular lamps with respect to the objects to be illuminated. Experience was that there was little shadow with an object lying across the line of a tubular source of light, but considerable shadow when objects were parallel to it. The shape of the area which could be effectively lighted varied with the height of suspension, the major axis being parallel with the source at low mounting heights, but at right angles to the source at greater mounting heights.

Mr. G. W. Golds was concerned with the "blackout" lighting of railway platform station names composed of lettering of limited sizes. On the whole he thought the solution might be found in sound, supplemented by loud-speakers at main stations, rather than light.

Mr. Harold Bright explained a convenient method of selectively dimming lamps on demand when connected to a DC circuit.

Mr. E. B. Sawyer described methods of measuring atmospheric absorption of light, combined with "scatter," in factories. In one factory the loss of light was 13 per cent. and in another 22 per cent. Thus the usual allowance of 30 per cent. for depreciation in available illumination allowed for when designing lighting installations might not be a sufficient factor of safety when dust and fumes contaminated the atmosphere.

Mr. R. Dawe spoke of developments that might aid in alleviating the discomforts of air transport due to confined passenger cabins. He mentioned the use of appropriately coloured light to counterbalance the effects of climatic variations. The light, not the fitting, should be the decorative feature.

Mr. H. Buckley dealt with the measurement of light transmitted through "blackout" materials and diffusing window-glass substitutes. In the case of normally incident light transmission factors could be deduced satisfactorily from the ratio of the set up in a rectifier type photocell by an exciting lamp about 3 ft. away, with and without the insertion of the screening material between them. Diffused incident light required a different arrangement, based on the use of a whitened sphere to serve as a diffusing source. Corrections were necessary for inter-reflections, etc.

Spark Behaviour

THE inadequacy of the classical theory of spark discharge when applied to long gaps at atmospheric pressure is discussed in a paper by Mr. J. M. Meek (Metropolitan-Vickers Electrical Co., Ltd.) submitted to the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 19th.

A brief description of the author's streamer theory, recently postulated, presents a completely new picture of the electric breakdown process in gaps, overcoming objections to the older idea and rendering possible the interpretation of many other sparking phenomena.

It not only explains observed happenings, but also incorporates a criterion, based on atom-physical considerations, which facilitates the calculation of the breakdown potentials of different gaps in which the field distribution is known. For those gaps in which corona is observed to precede sparkover, the corona onset voltage is that determined.

The results of such calculations for various types of gaps are described, with particular reference to the sphere-sphere gap. Various features of point-plane breakdown are also mentioned, and an explanation is given for the occurrence of the upward-growing positive streamer from the earthed plane when the high-voltage point is of negative polarity. It is further shown that in the case of lightning discharge from a negative cloud to earth in open country, upward-growing positive streamers from the earth are not likely to be more than a

few metres long and thus will rarely be observed.

The subject of irradiation and statistical time-lag is then dealt with in some detail. Various experiments are described to indicate that quite different results can be obtained according to whether the gap is illuminated or not by the light from neighbouring spark-gaps. The effect of such irradiation is important not only for short gaps but also for gaps several centimetres long, and in particular for the positive impulse breakdown of a sphere-gap when the spacing is greater than that corresponding to the Toepler discontinuity. In this regard certain criticisms are made of the published standard tables for voltage measurement by sphere-gaps.

The lowering of sparkover voltage for uniform and non-uniform gaps by the intense light radiated from a nearby spark source has also been investigated. An explanation of the various results obtained is given in terms of the new theory of the spark.

I.E.E. Luncheon

DEMAND exceeded the limited supply of tickets for the informal luncheon last week of the Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS at the Holborn Restaurant in London. Mr. S. W. Melsom, Section chairman, presided. In thanking members for their support he remarked that the attendance (213) had justified the Section Committee's somewhat timid venture. Social functions of that sort served the most useful purpose of providing opportunities for meeting colleagues which would not otherwise occur under prevailing circumstances. They were honoured by the presence of the chairmen of the other Sections as well as the President who, in addition to his duties as engineer-in-chief of the B.B.C., accepted I.E.E. office knowing it would occupy fully half his working time.

Sir Noel Ashbridge, in proposing the chairman's health, referred to the changing character of the work of the I.E.E., the cessation of normal activities having been accompanied by increasing war service, largely of the nature of committee work, which continued to grow with the subsequent resumption of ordinary meetings and discussions. Thus the work to be done had doubled, though staff had been depleted, in striking contrast to most other organisations in wartime. One of the most valuable services rendered by the I.E.E. had been the direction of technical men into the most appropriate channels, particularly in the telecommunication and wireless services. That was a scheme about the efficacy of which, Sir Noel said, he had originally had considerable doubt, but he now knew that very tangible results had been achieved.

Wireless was quite definitely engineering, not merely a branch of physics, because such devices as cathode-ray tubes and electron guns had to be employed, and much benefit would result from greater staff interchanges between the lighter and heavier sections of the electrical industry. He had attempted something of the sort himself and did not consider it to be so difficult as might appear at first sight.

Use paper sparingly—save all waste

Forthcoming Events

Institution of Electrical Engineers.—Monday, February 23rd, 6 p.m. London: Informal meeting. Discussion on "High-rupturing-capacity Devices up to 2 kV," to be opened by Mr. A. R. Blandford.

North Midland Centre.—Saturday, February 21st, 2.30 p.m. Hotel Metropole, King Street, Leeds. Paper: "Rationalisation of Colliery Electrical Equipment," by Mr. J. A. B. Horsley.

Mersey and North Wales (Liverpool) Centre.—Monday, March 2nd, 6 p.m., Liverpool Royal Institution, Colquitt Street. Paper: "Voice-frequency Signalling on Trunk Lines," by Messrs. W. G. Radley, Ph.D.(Eng.) and E. P. G. Wright.

Students' Section.—Saturday, February 28th. Lecture by Dr. W. G. Radley.

North-Western Centre.—Saturday, February 21st, 2.30 p.m. Engineers' Club, Manchester. Discussion on post-war planning to be opened by Messrs. B. A. G. Churcher, M.Sc., and J. W. Thomas, LL.B., B.Sc. (Tech.). Saturday, March 7th, 12.45 for 1 p.m. Wartime luncheon.

North-Eastern Centre.—Monday, February 23rd, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Paper: "City Distribution by Solid Low-voltage Networks," by Mr. B. Wood, M.A. *Students' Section.*—Saturday, February 21st. Pot-pie supper.

London Students' Section.—Friday, March 6th, 6.45 p.m. Comedy Restaurant, S.W.1. "Stag supper." Tickets (5s. 6d.) from Mr. E. M. Hickin, 57, Oldborough Road, North Wembley.

Association of Supervising Electrical Engineers.—Saturday, February 21st, 2.30 p.m. Lighting Service Bureau, Savoy Hill, London, W.C.2. Lecture: "The Control of Electric Furnaces," by Mr. W. Fordham Cooper, M.I.E.E.

British Institution of Radio Engineers.—*Midland Section.*—Friday, February 27th, 6 p.m. James Watt Memorial Institute, Birmingham. Paper: "Thermionic Frequency Control," by Mr. G. B. Baker (Murphy Radio, Ltd.).

Association of Mining Electrical and Mechanical Engineers.—*West Wales Branch.*—Saturday, March 7th, 5 p.m. Mackworth Hotel, Swansea. Joint meeting with South Wales and Monmouthshire Colliery Managers' Association. Discussion on "Report of Departmental Committee on Amendment of Electricity Regulations," to be opened by Mr. J. A. B. Horsley, O.B.E.

Meetings Revived

MR. R. Robinson (borough electrical engineer of Barnstaple), hon. secretary of the Devon and Cornwall Sub-Centre of the Institution of Electrical Engineers, informs us that it is more than two years since this sub-centre held meetings. The first meeting of this session will be held at 3 p.m. on February 28th, at the Royal Clarence Hotel, Cathedral Yard, Exeter, when the chairman (Mr. C. Culmer Hodges) will deliver his address on "Post-War Reconstruction." The chairman has expressed the wish for a discussion to follow his paper. Further meetings will be held at Plymouth in April and at Torquay in June.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

High-Pressure Steam

IN reply to Mr. H. Mahon's letter in your issue of February 13th, I quote from the full report of the starting-up technique for the Twin Branch high-pressure boiler:—

"Experience on the large boilers of the American Gas and Electric Service Corporation has indicated that the use of Calgonite for the removal of foreign matter deposited in the boiler units during the course of erection, when used in the proper concentration, was highly effective.

"The boiler was thoroughly washed out with cold untreated water and then with condensate before closing up. It was then completely filled with water treated with sodium sulphite and the temperature gradually raised to 200 deg. F. and maintained for five hours, heated by hydrokineter. The water level was then lowered and 6.7 lb. Calgonite and 1 3 lb. caustic soda per 1,000 lb. (67 lb. and 13 lb. per 1,000 gal. respectively) were then added in solution and the water heated and then brought under pressure. The gradual increase of temperature was considered desirable in order to avoid thermal stains. After the pressure had reached 75 lb. per sq. in. [320 deg. F.] the boiler was then blown down intermittently, the solids being progressively reduced from approximately 15,000 to 5,000 parts per million. Over a period of twenty hours the pressure was increased to 275 lb. per sq. in. [414 deg. F.] and maintained for five hours. During this period the steam was vented from the unit and the blow-downs continuously operated, further reducing the solids to 500 p.p.m.

"At 275 lb. per sq. in. the superheater and high-pressure steam drum were blown to atmosphere. After draining the boiler an inspection of the visible internal surfaces showed their freedom from oil and other foreign matter, no further boiling out being required. The boiler was re-closed."

From this is appears that sodium sulphite is the de-aerating agent, the process preceding what may be termed the dispersion process.

I believe Calgonite is a proprietary article, the main constituent of which is presumably calgon or sodium-hexa-meta-phosphate, $Na_6(PO_3)_6$. It appears in this case definitely to be used for the complete removal of oil residues left in the boiler during erection. It is a very good emulsifying agent and penetrates all interstices of tubes, joints and seam.

Calgon caters for $CaCO_3$ and $MgCO_3$, and having regard to the quantities used and also to an initial concentration of 15,000 p.p.m., other chemicals have evidently been included in the treatment. These are not specified, nor is the nature of the water indicated. It will also be noted that the blowing down and venting would have to be replaced by some form of water. This makes it extremely difficult, and indeed hazardous, to draw conclusions as to the nature and reason for the complete treatment.

For the precipitation of lime and magnesium salts, using calgon and caustic soda as given in the report, the reactions are as follows:— $Na_6(PO_3)_6 + 12(NaOH) \rightarrow 6Na_3(PO_4) + 6H_2O$, which is tri-sodium phosphate dodecahydrate and water.

The foregoing reaction must precede the reaction for $CaCO_3$ which is:— $2Na_3(PO_4) + 3CaCO_3 \rightarrow Ca_3(PO_4)_2 + 3Na_2CO_3$ or calcium phosphate plus sodium carbonate, which are precipitated in the form of a very fine sludge. Removal must be by blow-down arrangements *correctly* designed for treatment conditions.

Compared with tri-sodium-phosphate the treatment is more expensive, but each case must be examined individually to ascertain whether the advantages outweigh this point. Its advantages are that it reduces caustic alkalinity in boiler feed water, and it can be continuously fed with less risk of deposition of calcium phosphate in the feed lines.

The treatment is being increasingly used, but in this country present conditions have handicapped development. Calgon is a chemical of considerable importance in high-pressure boiler water conditioning.

In the field of high initial turbine terminal conditions in generating stations designed for high thermal efficiencies, I consider that there is considerable necessity for the adoption of more advanced boiler-feed conditioning methods. Further, techniques are available for scale prevention by means of calgon.

I should be glad to hear from engineers interested in the various aspects of high-thermal-efficiency generating stations covered by my article.

London, S.W. S. B. JACKSON.

Starting Currents

A POINT which arose in discussion of Mr. B. Wood's Paper on "Electricity Distribution in Cities" at the Institution of Electrical Engineers was the difficulty of restoring supplies after a failure, due to overload on networks.

Information is lacking as to the starting current of various items of apparatus such as electric lamps, radiators and cookers which are in common use.

I should be greatly obliged if any firms or individuals who have oscillographs giving such current curves would be kind enough to make them available for publication.

Erith. E. A. LOGAN,
Borough Electrical Engineer & Manager.

COMMERCE and INDUSTRY

Electricians' Bonus Increased. Purchase Tax Decisions.

Industrial Clothing and Rationing

THE Board of Trade has now decided to award supplementary clothing coupons to certain types of iron and steel workers in sections of the industry not covered by their previous award (ISCA.1302/41). Awards are now announced to certain workers in non-ferrous metal, coke and by-products, gas, salt, asphalt, textile, coal distributive industries and to dockers. These coupons will be issued to employers for distribution to their workers, and individual workers must not apply. Employers in the trades concerned should get into touch with their local office of the Ministry of Labour and National Service.

Gloves of particular types for working purposes, which are marked with the word "Industrial" may be sold coupon free. This ruling was made in the Consumer Rationing (No. 8) Order issued by the Board of Trade.

Skilled Men in the Forces

In the Beveridge Committee's report published this week it is proposed that a Corps of Mechanical Engineers shall be formed, to include both mechanical and electrical engineers, so that they can be given their appropriate place in the Army system.

St. Pancras Appointments Policy

It was reported at last week's meeting of St. Pancras Borough Council that a communication had been received from the Electricity Commissioners referring to the position of employees who apply for permission under the Essential Works (General Provisions) Order, 1941, to leave their present employment to take up more responsible posts in other electricity undertakings. This indicated that in general it was not intended that the Order should restrict normal promotions. In view of this statement the Electricity and Lighting Committee had decided that, wherever possible, any vacancies in staff would be filled by the promotion of the existing staff, such promotions to be regarded, however, as of a temporary nature, and subject to review after the termination of the present hostilities.

Loughborough Warship Week

The Warship Week effort of the Brush Electrical Engineering Co., Ltd., was opened on February 6th, by Sir Noel Curtis-Bennett, K.C.V.O., when he addressed a large gathering of the company's employees in the works canteen. The chairman, Mr. H. E. Midgley, a director, said that to encourage investment by employees during the week the company had agreed to subscribe one shilling towards each certificate purchased by employees of the company, so that such certificates would cost employees 14s. instead of 15s. The company had also decided that when this investment had finished they would themselves put in twice the amount subscribed. After Sir Noel had asked for the fullest support to be given to the appeal, Mr. D. B. Hoseason, a director of the company, proposed a vote of thanks to him which was seconded by Mr. Barber. Loughborough's target is £210,000 for the adoption of the destroyer H.M.S. *Venomous*.

Electrical Workers' Wages

At a recent meeting of the Joint Industrial Council for the Electricity Supply Industry it was decided that the war bonus should be increased from 2¾d. to 3½d. per hour as from the commencement of the first full pay period following February 1st. This bonus is reckoned in calculating overtime.

Post-war Reconstruction

In connection with the formulation of an E.A.W. policy on post-war reconstruction, members of the London Branch recently held a discussion on "Electrical Housecraft Instruction in Schools." Mrs. Edwards, who was to have opened the discussion, was unable to do so owing to illness, but her place was very capably taken by Miss Norvick. Mrs. Bentham presided. Many original and constructive ideas were put forward and a report of these is to be sent to headquarters.

U.S. Plant Output

At a recent meeting in New York Mr. Ralph Kelly, vice-president in charge of sales of the Westinghouse Electric and Manufacturing Co., disclosed that the HP of steam turbines now being built for the Navy and merchant marine service amounts to about one-half of the capacity at present installed in public utility undertakings. In addition to ships' turbines, electrical manufacturers are constructing land turbines and waterwheel generators of a combined rating exceeding 5,000,000 kW; orders for motors have about trebled since early 1940, while orders for transmission equipment have more than doubled. The Westinghouse Co. alone is producing electrical equipment at a rate that exceeds a million dollars in value daily and it expects to enlarge its production by half as much again next year.

Purchase Tax on Appliances

Further to the note on page 179 of our February 6th issue, we have received from the British Electrical & Allied Manufacturers' Association particulars of revised arrangements made with the Customs & Excise authorities in respect of Purchase Tax on other electrical appliances. As from February 1st the Commissioners will accept standard "wholesale values" calculated by reference to the current fixed retail list selling prices less specified maximum discounts, without further adjustment in respect of cash discount or delivery charges. The goods are in four classes, as follows:—

(A) Discount 25 per cent.:—Boiling plates and rings, chafing dishes, cigar lighters, cookers (breakfast), curling tong heaters, curling and waving irons, egg boilers, fires, radiators, convectors, floor polishers, fruit juice extractors, grill boilers, grillers, hair dryers, health exercisers, hot plates (portable), irons, kettles, milk heaters, sterilisers, porringers, mixers, motor car heaters,

percolators (coffee), saucepans, sewing machine motors, shaving pots, steamers, teapots, toasters, towel rails and heaters, vacuum cleaners, vibrators, waffle plates, warming pads, bottles and blankets, warming plates and wash-boilers.

(B) Discount 22 per cent.:—Dish washers, drying cabinets, ironing machines and washing machines.

(C) Discount 17½ per cent.:—Cookers and hot-cupboards.

(D) Discount 22 per cent.:—Domestic electric refrigerators up to 12 cu. ft. capacity.

Acceptance by the Commissioners of these standard values is subject to the understanding that if in particular cases sales are made to retailers at net prices including delivery charges, in excess of the values shown, the tax should be calculated on the actual net free-delivered selling prices. This, in effect, means that Purchase Tax on these goods despatched on and after February 1st will be charged at the following rates, subject to the foregoing proviso :—Class A, 25 per cent. of current list prices; B, 26 per cent.; C, 27½ per cent.; and D, 26 per cent. This means that, apart from the proviso, the tax on Class A and D goods is unaltered.

Belfast Chief's Salary

The Belfast Electricity Committee, at its last meeting, decided to ask the Corporation's special committee of six to reconsider its decision that the salaries of the new managers of the Electricity and Gas Departments should be fixed at £1,750 as an inclusive minimum. Under the National Joint Committee's scale, the Belfast electricity output warrants a higher salary than that recommended, and the Committee is of the opinion that an engineer should not be asked to go against his Association. Mr. F. H. Whysall, the present city electrical engineer and manager, is retiring at the end of March.

Brazilian Rubber

The Washington correspondent of *The Times* states that the Brazilian Minister of Finance recently arrived in Washington to seek American aid in tapping the huge wild rubber sources in the jungles of the Para Amazonas and Matogrosso. This would involve technical and financial assistance in establishing the industry and a guarantee of post-war continuance of rubber purchases. Several other Latin-American countries have begun to develop rubber plantations.

Industrial Fuel Supplies

The Board of Trade has drawn the attention of industrial fuel consumers to the urgent need for avoiding conversions of plant from one fuel to another (*e.g.*, from oil to coal, etc.), except on the advice of one of the Government Departments. Such changes, it is stated, often involve diversion of labour and materials from more vital needs and lead to unnecessary fuel supply difficulties.

If a change from one type of fuel to another, or the installation of new plant, is contemplated, the consumer should first consult the appropriate Government Department. In the case of a consumer executing contracts for one of the Production Ministries, this Ministry should be consulted and will in turn when necessary approach the department of the Board of Trade responsible for the fuel to which the conversion is contemplated. A consumer not executing contracts for one of the Production Ministries should approach the appropriate fuel department of the Board of Trade *direct*. The fuel departments are as follows:—In the case of electricity, the Electricity Commission through the local electricity supply undertaking; in the case of coal, the Mines Department through its Divisional Coal Officers; in the case of liquid fuel, the Petroleum Department, Millbank, S.W.1; in the case of gas, the Directorate of Gas Supply, Board of Trade, New Oxford House, Bloomsbury Way, W.C.1. The consumer will then be directed in the light of available fuel and plant supplies.

Spanish Nitrate Production

The Spanish journal, *Metalurgia y Electricidad* reports the recent formation in Bilbao of a new company with a capital of 100 million pesatas and the title of La Sociedad Nitratos de Castilla with the object of establishing works in the province of Valladolid, for the electrolytic production of nitrates. The plant is being supplied by the German I.G. Farbenindustrie, of Frankfort-on-Main, while the necessary power will be furnished by the Sociedad des Saltos del Douro, which owns a hydro-electric power station in the district. The works will, it is stated, be planned for an annual output of 64,500 metric tons.

Whitaker's Almanack

Delay in publication of the 1942 " Whitaker's Almanack " has been caused by the destruction of the works of its London printers by enemy action, which necessitated almost complete resetting. This has provided an opportunity to modernise the type and to improve the general look of its pages. The events of the second year of the war are fully chronicled, and statistics dealing with matters of special interest in the settlement of post-war problems have been supplied wherever possible. If some of the tables appear to be out of date it must be remembered that information likely to be of service to enemy nations in time of war must not be made available. In place of last year's black-out times, the tables of sunrise and sunset have been inserted, with full details as to how black-out times may be worked out. This has been done to avoid inaccuracy due to future legislation. There are the usual three editions:—Complete edition (1,024 pages, cloth-bound), 10s.; library edition (leather-bound with a special section of coloured maps), 15s.; and the shorter edition (724 pages paper-bound), 5s.

The Story of the Magneto

Mr. Frederick R. Simms, whose name is prominently associated with the development of the magneto for motor-car ignition, has published an interesting account of his work under the title " The History of the Magneto." His earliest patents in this field were taken out in 1895 and Mr. Simms tells of his transactions with Robert Bosch, of Stuttgart, who made the earliest models for him and later joined him in the production and sale of the Simms-Bosch machine. It proved an unsatisfactory partnership and Simms was forced at last to break away from Bosch and form an independent company

to produce his magnetos. The booklet recounts how intensive undercutting by the German eventually caused the closing of the works and the acquisition of the business by the B.T.H. Co. which, with its strong resources, was able to establish the industry here.

After dealing very briefly with other types of magneto which have been evolved in this country Mr. Simms expresses the view that while coil ignition will continue to be used practically as a standard for the modern private car, where the greatest reliability is required the magneto will hold its own.

Production Advisory Committees

Although in the first place confined to ordnance factories, the proposed establishment of joint production consultative and advisory committees has a wider interest. These committees will consist of representatives of managements and trade unions, and their functions will be to consult and advise on matters relating to production and increased efficiency in order that the maximum output may be obtained.

Tin Control

The Minister of Supply has made the Control of Tin (No. 4) Order, 1942 (Stationery Office, 1d.), which came into force on February 16th. Under the earlier Control of Tin (No. 3) Order, acquisition of tin was made subject to licence or direction by the Minister; the definition of tin in that Order embraced ores, concentrates, residues, etc., as well as defined forms of metallic unwrought tin and tin scrap. The present Order brings the tin content of alloy scrap containing not less than 12 per cent. of tin and of tinplate clippings and waste within the definition.

Persons who acquire not more than one hundredweight of tin in any calendar month, and persons who do not treat, use or consume tin scrap, alloy scrap as above-mentioned, tinplate waste, or tin residue, slag, dross or sludge otherwise than by cleaning, crushing or sorting it, are exempted from the licensing provisions regarding these materials. All inquiries should be addressed to the Joint Controllers of Non-Ferrous Metals, Grand Hotel, Rugby.

Lamp Window Display

Thorn Electrical Industries, Ltd., has prepared an attractive display which it is installing in the windows of "Atlas" lamp dealers. The colours chosen are blue and yellow and, in addition to lamp cartons artistically arranged, includes showcards with the picture of a cat and the slogan "See Better with Atlas."

Trade Announcement

Mr. L. J. Gellion, Birmingham representative of the Wardle Engineering Co., Ltd., has removed to Winchester House, Victoria Square, Birmingham, 2. The telephone number remains unchanged.

Catalogues and Lists

The Wardle Engineering Co., Ltd., Old Trafford, Manchester, 16.—A revised price list and wartime price advances of the company's products; also illustrated and priced leaflets of adjustable machine tool lighting fittings, flameproof fittings, bulkhead fittings and reflectors.

British Insulated Cables, Ltd., Prescot, Lancs.—Illustrated descriptive catalogue of jointing tapes in seventeen varieties.

Calendars

We have received from Macrome, Ltd., a calendar which has large monthly sheets showing the preceding and two following months, as well as lighting-up times, etc.

Howells (Electric Motors), Ltd., whose London office is now at 29, Winchmore Hill Road, Southgate, N.14 (telephone: Palmers Green 5428) have sent us a card bearing the calendar for 1942.

Changes of Name

Davey, Paxman & Co. (Colchester), Ltd., have changed their name to Davey, Paxman & Co., Ltd.

The title of Mabeco, Ltd., has been changed to Mullard Wireless (Near East), Ltd.

TRADE MARK APPLICATIONS

AMONG recent applications for British trade marks are the following. Objections may be entered within a month of February 11th:—

PARAFLEX. No. 616,728, Class 1. Material composed principally of synthetic resin plastics (not of the nature of rubber) sold in the form of rods, sheets, tubes and similar shaped pieces, all for industrial purposes.—Erinoid, Ltd., Kent House, Telegraph Street, London, E.C.2.

KSB (design). No. B614,821, Class 7. Centrifugal pumps, submersible artesian well pumps, semi-rotary wing pumps, hand pumps and air pumps (none being air pumps for vehicles or pumps for scientific or surgical purposes); submersible electric motors; steam traps and compressors, all being parts of machines.—K.S.B. Mfg. Co., Ltd., 6, Broad Street Place, London, E.C.2.

TELCOVIN. No. 617,347, Class 9. Insulated electric cables.—Telegraph Construction and Maintenance Co., Ltd., 22, Old Broad Street, London, E.C.2.

LASSOLAC. No. 617,165, Class 17. Insulating varnish.—Herts Pharmaceuticals, Ltd., Bessemer Road, Welwyn Garden City.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have the present addresses of the following:—

R. M. ELECTRIC, LTD.
PERMAVOX, LTD
N. M. STRONG & CO.
VARIABLE POWER TRANSMISSIONS.

Suppliers of commutator stone consisting of a cream-coloured, mild abrasive powder in block form with moulded upper edge.

Electrical Man-Power

Directions to Supply Undertakings

POSSIBLE effects upon the operation and maintenance of electricity supply undertakings of any further depletion of manpower were discussed at a recent meeting between the Electricity Commissioners, the Joint Committee of Electricity Supply Associations and the National Service Committee of the National Joint Industrial Council and National Joint Board fo the Electricity Supply Industry. As a result of the discussion certain suggestions were transmitted to the Ministry of Labour and National Service.

The Ministry has now given an assurance that the male staff of electricity undertakings in general will not be further reduced by the calling-up of men for the Forces; and that any man who is refused deferment on the ground that he is redundant will be first regarded as available for employment elsewhere within the industry. In the case of clerical workers, however, if they are refused deferment they will be regarded as available for transfer to other industries or for calling-up.

The foregoing is subject to the understanding that it may be necessary from time to time to ask the industry to release a strictly limited number of men with professional or technical qualifications to meet special Service requirements or for important service outside the supply industry. In considering the placing within the supply industry of any redundant technical officers of Central Register qualifications, special consideration will be given, in consultation with the Register, to the question whether such officer could make a greater immediate contribution to the war effort by being placed in other employment outside the electricity supply industry.

Deferment Procedure

Applications for the deferment of the calling-up of individuals will generally be made by undertakings on Form N.S. 300. It is necessary only to complete Part 1 of the form so that consideration may be given to the man's position in the light of his present employment (which is not necessarily disclosed by his registration documents). The Local Office of the Ministry will refer the applications direct to the appropriate District Man-power Boards.

These Boards will deal with applications on an establishment basis (*i.e.*, from the standpoint of the staff requirements of the undertaking as regards men in the particular occupational classification concerned) and it will not be necessary for undertakings to make out a case for deferment on each application. The Boards will notify the employers whether (*a*) the man is granted deferment until further notice, but not less than six months; (*b*) deferment for a limited period, not exceeding six months; or whether (*c*) the application is rejected. In the case of (*a*) a review will be made periodically by the Ministry and until the review takes place it will be unnecessary for undertakings to apply for further deferment. As regards (*b*) undertakings, if they so desire, must renew their applications on Form N.S. 300 at least fifteen days before the expiration of the period granted. In the case of a rejection the matter will be referred to the Commissioners before the Ministry arrives at a definite decision.

Clerical Staff

The foregoing procedure will not apply in the case of the following officers of local authority undertakings:—Local authority whole-time officers not specifically reserved at a lower age by reason of their employment, or specifically excluded from reservation (page 52 of the Schedule of Reserved Occupations); clerical and office staff (page 15 of Schedule); and accountants (page 1 of Schedule). In these cases applications for deferment should be made on Form N.S. 300 to the Electricity Commissioners who will either recommend deferment to the Ministry or notify undertakings that they are unable to do so. Where an extension of existing deferment is sought applications should be made to the Commissioners about twenty-eight days before the expiry of the period.

Where deferment is refused on the ground that the employee is redundant the Ministry has agreed to consult the Electricity Commissioners as to placing him in another undertaking. If in any instance an undertaking does not propose to apply for deferment in respect of a member of its technical staff the Electricity Commissioners should be notified at least a month in advance of de-reservation and particulars of the employee should be sent with a view to placing him in another undertaking where there is a vacancy.

Female Employees

Women employed by supply undertakings in a professional, technical or administrative capacity, and shorthand typists and machine operators employed on such work for not less than half their time are not to be withdrawn. Special consideration is to be given to the retention of women in these categories who were not in the employment of an undertaking at the time of registration but had been engaged before August 1st, 1941. Other women aged 20–25 at the time of registration are to be withdrawn.

Women in skilled or semi-skilled grades on

repair, maintenance or operational work are not to be transferred, but other women aged 20–30 at the date of registration will be withdrawn.

The Local Office of the Ministry of Labour will supply undertakings with particulars of the women whose withdrawal is under consideration and will also inform them of the special arrangements governing the withdrawal of women and ask the undertaking to make proposals for a timetable of withdrawals. Adequate time will be given for the provision and training of substitutes.

With regard to women who have already registered, the Local Officers will send separate communications to the undertakings concerned which will then be able to apply for deferments in suitable cases.

At the meeting referred to in the opening paragraph it was decided that man-power matters could best be dealt with by a Central Committee. This Committee has been appointed; the chairman is Mr. C. G. Morley New, who with Sir Leonard Pearce will represent the Electricity Commissioners. The National Service Committee is represented by Alderman W. Walker (substitute Alderman Sir Percival Bower), Col. S. E. Monkhouse (substitute Mr. C. D. Taite), Mr. T. Cochrane (substitute Mr. H. P. Bolton) and Mr. W. Arthur Jones (substitute Mr. E. Laming). The joint secretaries are Messrs. C. J. Hornsby and A. H. Banks.

It is asked that inquiries should not be addressed directly to this Committee but to the Electricity Commissioners.

ELECTRICITY SUPPLY

Bulk Supply Association.

Cardiff.—PENARTH UNDERTAKING.—The Electricity Committee reports that the Electricity Commissioners consider that the present is not an opportune time to raise such a contentious issue as that involved in the acquisition of the Penarth electricity undertaking.

Carlisle.—SUPPLY TO RURAL AREA.—The Electricity Committee is to extend mains in the rural area at a cost of £571.

Coventry.—LOAN.—The Electricity Committee is seeking sanction to borrow £3,387 for the provision of a new supply.

Dover.—BULK SUPPLY ASSOCIATION.—The borough electrical engineer (Mr. R. G. Widgery) reported to the Electricity Committee recently that electricity undertakings in Kent and Sussex were forming an association to consider all bulk supply matters of mutual or individual interest. Many undertakings were dissatisfied with the coal clause, and there was also the question of the kVA charges. Similar associations in the North of England and Wales had obtained profitable results. It was decided to join the association.

Eston (Grangetown).—SHELTER LIGHTING.—The Urban District Council is to submit to the Regional Technical Advisor proposals for the provision of electric lighting in all communal shelters at an estimated cost of £7,244.

Glasgow.—FIRE PROTECTION AT SUBSTATION.—The Electricity Committee is to extend the "Mulsifyre" system at Port Dundas substation at a cost of £1,585.

Huddersfield.—LOAN FOR METERS.—Sanction has been granted by the Electricity Commissioners for the Corporation to borrow £5,000 for meters.

Ilkeston.—INSTALLATIONS IN COUNCIL HOUSES.—At a recent meeting of the Corporation Housing Committee a request was received from the Trades Council that consideration should be given to the installation of electricity in Council houses, and the town clerk was asked to ascertain whether the Derbyshire & Nottinghamshire Electric Power Co. could do so and at what cost.

A Lanarkshire Complaint.

Lanarkshire.—PROTEST AGAINST INSTALLATION DELAY.—A proposed electrical installation in a village hall was referred to by Major Monteith at a Lanarkshire District Council meeting recently. He said that very little material would be required to install lighting and heating as the electricity cables were just outside the hall. Permission to proceed with the work had been requested from the Department of Health in Edinburgh, but its reply was that the matter must go to the Ministry of Health in England. Major Monteith considered that it was "perfectly monstrous" that people in Scotland must wait two or more months to get authority from England to put in a few yards of wiring. It was agreed that the matter should be raised in Parliament by the Member.

LIGHTING OF REST CENTRES.—A number of schools in Coatbridge are used as rest centres, and the Council recently approached the Lanarkshire County Education Committee with regard to the lighting installations. It was pointed out that gas lighting was considered a serious drawback in the proper running of a rest centre, and the Education Committee was asked to assist the local authority in the installation of electric lighting. The Committee, however, replied that it could not see its way to meet the Council in the matter.

Leeds.—NO PRICE INCREASE.—When the 1942-43 estimates of the Electricity Department were submitted to the Electricity Committee recently it was stated that no increase in the price of electricity had taken place since the outbreak of war and in framing the estimates no provision was made for any increase in 1942-43.

Liverpool.—SUPPLY TO HOUSING ESTATE.—The Town Council has approved the provision of mains and substation equipment for supplying electricity to an estate at a cost of £6,463.

London.—ST. PANCRAS.—The Electricity and Public Lighting Committee has authorised the laying of new cable ducts in Hampstead Road while the road is being repaved; the provision of ventilating and fire extinguishing equipment at substations; and the replacement of a boiler superheater, these works involving a total estimated cost of £1,079.

Musselburgh.—LAMP STANDARDS TO REMAIN.—The Town Council at its last meeting accepted a report by a committee rejecting a proposal to remove street lamp posts as scrap for the national war effort. The Committee felt that there would be great difficulty in replacing lamp posts at the end of the war which might result in there being no street lighting for some considerable time afterwards.

Peterborough. — SUBSTATIONS. — The Town Council is seeking sanction to a loan of £1,579 for substations.

Rugby.—EXTENSIONS.—The Town Council is recommended to apply for sanction to borrow £1,566 for electricity extensions.

Smethwick.—SCHOOL SHELTER INSTALLATIONS. —The Emergency Committee is to install lighting and heating at Brasshouse Lane school shelters at a cost of about £297.

Swindon.—SWITCHROOM ALTERATIONS.—The Electricity Committee is to ascertain the views of the Electricity Commissioners regarding a scheme for the reconstruction of the switchroom annexe at a cost of £6,350.

Overseas

Germany.—ELECTRICITY FROM NORWAY.—Plans for the construction of a submarine cable from Norway to Denmark to convey hydro-electric power to Germany are shortly to be put into operation, according to a Norwegian trade journal quoted by the Norwegian Telegraph Agency. The Germans, in need of electric power for their war industries, are hurriedly building large power stations in Norway, it is stated.

India.—CENTRAL ELECTRICITY AUTHORITY.—*Reuter* reports that the Government of India has formed a central electric power control board to advise on the more effective control of the working and development of electricity undertakings in the interests of the war effort. Provincial Governments have agreed to assist in the administration of the control, which is designed to meet the demands of the expanding war industry.

TRANSPORT

Glasgow.—TRANSPORT WORKERS' CANTEENS.—When the Corporation decided to provide nine new canteens in the depots and garages of the Transport Department the first problem was whether to install electrical or gas equipment. Electricity was chosen, and the reasons for this decision are given by Mr. E. R. L. Fitzpayne, B.Sc., deputy general manager and chief engineer of the Department, in an article published in the *Passenger Transport Journal*.

He notes that the two existing canteens had gas equipment, and the general opinion among canteen operators was that gas was superior, but none could give any real reason for this. Electricity was chosen because, first, as an electric transport undertaking they knew the advantages of electricity, and, secondly, because they realised that in the event of severe air-raids the electric canteens would function so long as the tramways were operating. There was one important proviso in that they admitted the superiority of gas for boiling purposes and therefore the "Teatomaton" and soup boilers were heated by gas. Incidentally, they found in the works canteen that the gas refrigerator which was installed emitted so much heat that special arrangements had to be made for ventilation. On the subject of ventilation, they also found that this was very important both in the kitchen and the canteen itself, calling for a liberal use of exhaust fans.

Southend-on-Sea.—TROLLEY-BUS LINK.—The Minister of War Transport has made the Southend-on-Sea Corporation (Trolley Vehicles) Order, 1942, which authorises the construction of a trolley-bus connection about 135 yards long between existing routes, namely, from the junction of London Road with Leigh Road to the junction of Nelson Road with Wellington Avenue.

Commissioners' Memoranda

FOLLOWING upon the appointment of Regional Fuel and Power Controllers it has been arranged that the District Managers of the Central Electricity Board shall be available for advising the Controllers when desired on matters concerning electricity supply in their Regions.

Fire-watching Exemptions

The Electricity Commissioners state that cases have come to their notice in which certificates purporting to grant exemption from fire-watching duties have been signed and issued by officers of electricity undertakings. They state that the prescribed certificate "D" on form C.E.O. 3 must be signed by a person authorised by the appropriate authority and that they have not hitherto authorised any electricity undertakers or their officers to issue such certificates on their behalf. Therefore the documents referred to have no validity as certificates of exemption.

Rationing Notifications

When the Fuel & Lighting Order was issued in 1939 franked forms were supplied to electricity undertakings for circulation to their consumers notifying them of the proposed restrictions in consumption. These forms were never issued and the Commissioners say that they can now be regarded as waste paper and handed over to the local salvage organisations.

The new forms which bear no postage frank and have been printed by the undertakings themselves (the cost being refunded) should be retained in readiness for distribution should it become necessary for rationing to be introduced.

Annual Accounts

The provisions of the Public Utility Undertakings (Electricity) Order, 1941 (S.R. & O. No. 452) relating to the circulation of annual reports and accounts have been relaxed by the Board of Trade to the extent that copies (clearly marked "Confidential") may be made available to members of local authorities owning undertakings, the directors of supply companies, and members of the Central Electricity Board and Joint Electricity Authorities and Boards.

These reports and accounts may only be printed by the undertakers themselves, if they have the facilities. The forwarding of the documents to outside printers would be regarded as an infringement of the directions.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The English Electric Co., Ltd., in the full report now issued, shows a trading profit of £515,321 for 1940 as compared with £517,066 for the preceding year. Debenture interest absorbs £47,217, fees £5,500, and depreciation £100,000, leaving a net profit of £362,604 (against £363,736). The ordinary dividend for the year is maintained at 10 per cent., general reserve again receives £100,000, and £51,018 is carried forward (against £54,495 brought in).

The Westinghouse Brake & Signal Co., Ltd.—In the course of his speech at the annual meeting held on February 10th, Lord Southborough (chairman) said that every department of the company's business had been fully occupied and the total output had been on a high level.

Capt. B. H. Peter (managing director) said that the number of women employed had greatly increased. With regard to exports, it was essential to realise the increasing difficulties and the fact that export work could only be carried on on a very small scale, and even then only for the purpose of providing essential goods.

The Power Securities Corporation, Ltd., which controls Balfour Beatty & Co., Ltd., reports a rise in gross profit from £69,027 for 1940 to £124,680 last year. The balance after providing for taxation is £52,035 (against £48,974). The ordinary dividend is maintained at 6 per cent. The directors state that, apart from the Italian investment, the actual value of investments is in excess of that shown in the balance sheet.

The Bristol Tramways & Carriage Co., Ltd., reports a net profit for 1941 of £218,387, as compared with £205,639 in the preceding year. The final ordinary dividend is 5 per cent., making 10 per cent. for the year (against 8 per cent.).

Mather & Platt, Ltd., report a net profit for 1941 of £156,066, as compared with £159,703 for 1940. The final ordinary dividend is 6 per cent., maintaining the distribution for the year at 10 per cent.

The Consolidated Signal Co., Ltd., announces a net profit for the year to September 30th of £19,957, as against £22,318 for 1939-40. As already announced it is proposed to maintain the dividend for the year on the ordinary stock at 17 per cent.

The Bognor & District Gas & Electricity Co., has announced final dividends of 3¾ per cent., making 7½ per cent., on "A" stock, 4¼ per cent., making 8½ per cent., on "B" stock, and 3½ per cent., making 7 per cent., on the maximum stock.

The Mid-Southern Utility Co. has declared the following final dividends maintaining the distribution at the 1940 figures:—"A" stock £2 12s. 3d. per cent. (making £5 4s. 6d.); "B" stock £1 17s. 3d. (making £3 14s. 6d.); "C" stock £2 10s. 0d. (making £5 0s. 0d.).

British Ropes, Ltd., is paying a final ordinary dividend of 7½ per cent., again making 12½ per cent. for the year.

The Northampton Electric Light & Power Co., Ltd., has announced a final dividend on the ordinary stock of 6 per cent., making 10 per cent., less tax, for the year (same).

The Rushden & District Electric Supply Co., Ltd., is paying a final dividend of 5 per cent. actual (1s. per share), less tax, making 9 per cent. for the year (unchanged).

The Brush Electrical Engineering Co., Ltd., has placed privately £50,000 of 5½ per cent. cumulative preference stock and £27,000 of ordinary stock.

Companies' Returns

Statements of Capital

Richmond (Surrey) Electric Light & Power Co., Ltd.—Capital, £400,000 in £1 shares. Return dated April 8th (filed September 29th). 310,000 shares taken up. £200,000 paid. £110,000 considered as paid. Mortgages and charges: Nil.

Submarine Signal Co. (London), Ltd.—Capital, £1,000 in £1 shares. Return dated August 5th (filed November 27th). All shares taken up. £1,000 paid. Mortgages and charges: Nil.

Stuart Electrical Co., Ltd.—Capital, £4,000 in £1 shares. Return dated August 28th. 1,865 shares taken up. £502 paid. £1,363 considered as paid. Mortgages and charges: Nil.

Mortgages and Charges

Underwood (Electric), Ltd.—Assignment, on January 21st, 1942, of proceeds of various contracts, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £9,900.

Assignment of contract moneys, dated January 28, 1942, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £600.

"Diamond H" Switches, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated January 28, 1942, to secure £10,000. Holders: Branch Nominees, Ltd.

Bankruptcies

R. F. Lovegrove (Wallace Cook & Co.), electrical engineer, 34, Green Lane, Northwood, Middlesex.—Trustee, Mr. N. W. Osborne, 6, Warwick Court, London, W.C.1, released January 26th.

W. Price & A. Greenburgh (W. Price & Co.), electricians, 29, Russell Street, Plymouth. (Separate estate of A. Greenburgh.)—Last day for receiving proofs for dividend February 28th. Trustee, Mr. A. N. F. Goodman, 1, Church Lane, Tavistock, Official Receiver.

Liquidations

Jarvis Bros., Ltd.—Winding up voluntarily. Liquidator, Mr. J. H. Tate, of Peat, Marwick, Mitchell & Co., Royal Exchange, Middlesbrough.

STOCKS AND SHARES

TUESDAY EVENING.

NOBODY can expect Stock Exchange markets to show any degree of activity, or of noticeable firmness, at the present time. Last week's news of the naval battle in the Straits of Dover caused an atmosphere of depression which spread throughout most of the markets of the House. As a usual corollary to anxiety the firmness of gilt-edged securities showed up well against the background of heaviness in others. There was, however, no great pressure to sell. On the other hand, a certain amount of bargain hunting went on.

The influence of the many "Warship Weeks" now being held all over the country, is shown in the quietude of British Government stocks and their immediate satellites. It is of interest to hear in the Stock Exchange the opinion that the time is now ripe for an extension of the Trustee Act to securities at present outside its range. So limited has become the choice that the extension of the Trustee Act to such stocks as, for example, those of the Central Electricity Board, would undoubtedly help the public and the Stock Exchange markets by affording a greater area of selection.

An outstanding feature in the following lists is the remarkable manner in which ordinary shares of the electrical manufacturing and equipment companies have stood up to the prevailing conditions of depression.

Australia's War Plan

The Australian Government threw an apple of discord into many markets by the announcement of its intention to control the direction of Australian finance, industry and incomes. The plan as published was so drastic as to evoke no little wonder as to its precise meaning and application. One proposal is that profits shall be pegged at a maximum of 4 per cent. on capital. How this will operate in the case of an Australian company upon whose shares dividends of a higher rate than 4 per cent. are being paid, nobody seemed to know last week. In the absence of more exact details, the prices of Australian industrial stocks and shares have been left practically unchanged. In the case of the Australian Government stocks, a number stand at what are called minimum prices; prices, that is to say, below which no one is allowed to sell his stock in the market.

Price Adjustments

The principle of minimum prices is applied mainly to fixed-interest securities of front-rank order. It has no bearing upon such shares as those of electricity supply and kindred commercial companies. But if the 4 per cent. already quoted is to be considered the war "ceiling" for dividends upon Australian stocks and shares, it is clear that prices will have to be adjusted in order to bring them into line with present-day values. The Australian Government was expected to make some official explanation of the terms just mentioned. Until this appears, dealing in Australian shares of any type is going to be a difficult task.

Price Fluctuations

Amongst Home electricity supply shares, Northamptons hardened to 46s. 3d. on maintenance of the annual dividend of 10 per cent. Northmets strengthened to 35s. 9d. Similar gains were shown by Metropolitan, Electrical Distribution of Yorkshire and British Power & Light shares. The only change worth noticing in the Overseas group is 1/16 fall in Madras Electrics to 21s. 3d. Cable and Wireless stocks are dull on fears that the combine may suffer from the extension of enemy activities in Malaya and the Middle East.

Mexican Light & Power first mortgage bonds recovered the 5 points which they shed last week, and again stand at 80. Rio Tramway bonds at 95½ are 2 points up, Brazilian issues being in favour at the moment, though Brazilian Tractions, with ¾ fall at 13¼, have failed to hold the full extent of the rise that they recently secured. British Electric Traction deferred at 925 is 10 points lower. Bristol Trams at 43s. 9d. are unaffected by the increase in the dividend from 8 per cent. to 10 per cent.

Manufacturing & Equipment

Considering the rises which they have gained of late, the prices of ordinary shares in the equipment and manufacturing group keep extremely firm. It would scarcely have been surprising had there been a reaction in this section, but what falls have occurred are mostly small and insignificant. Tube Investments at 85s. are a little easier. Murex fell ½ to 95s. and E.M.I. lost 9d. at 13s. 9d. Ward and Goldstone at 19s. have added 1s. to their last week's rise of 1s. 6d. Amongst other shares to show rises are British Aluminium, British Insulated, Ever Ready, Johnson & Phillips, and Hall Telephones.

Singapore Traction

The Singapore Traction Co., Ltd., now seventeen years old, for years past commanded respect in the Stock Exchange by reason of the progressive character of its business. For the year ended September, 1932, the net profit was £35,696 and the company carried 36½ million passengers. For the year ended September 30th, 1940, the net profit came to £93,000 and in that year more than 60 million passengers were carried. In each of the past three years, annual dividends of 7½ per cent. on the ordinary shares have been paid. The last dividend was an interim of 2½ per cent. in August, 1941. The price of the ordinary shares went to a guinea last year, the lowest being 18s. 3d. The present price is somewhat nominal, as may be supposed, at 15s.; the

(*Concluded on page* 255)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Feb. 16	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	55/–	..	4 11 0
British Power and Light	7	6	27/6	+6d.	4 7 3
City of London	7½	7	27/–	..	5 3 9
Clyde Valley	8	8	38/9	..	4 2 0
County of London	10½	8	38/3	..	4 3 4
Edmundson's:					
7% Pref.	7	7	33/3	..	4 4 4
Ord.	6	6	28/6	..	4 4 3
Elec. Dis. Yorkshire	9	9	42/6	+6d.	4 4 9
Elec. Fin. and Securities	12½	12½	45/–	..	5 11 2
Elec. Supply Corporation	11½	10	45/–	..	4 9 0
Isle of Thanet	2	Nil	9/–	..	—
Lancs Light and Power	7½	7½	34/6	..	4 7 0
Llanelly Elec.	5½	5½	22/–	..	5 0 0
Lond. Assoc. Electric	5½	4½	19/6	..	4 12 4
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	105	..	4 15 3
Metropolitan	10	8	37/6	+6d.	4 5 6
Midland Counties	8	8	38/9	..	4 2 0
Mid. Elec. Power	9	9	41/3	..	4 7 4
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	30/9	..	4 11 1
7% Pref.	7	7	34/–	..	4 2 4
Northampton	10	10	46/6	+6d.	4 6 7
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/9	+9d.	3 18 4
6% Pref.	6	6	31/–	..	3 17 5
Richmond Elec.	6	6	23/9	..	5 1 1
Scottish Power	8	8	38/9	..	4 2 9
Southern Areas	5	5	19/6	..	5 2 8
South London	7	7	25/–	..	5 12 0
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	21/3	..	4 4 8
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/6	−3d.	—
Calcutta Elec.	8*	7*	31/3	..	—
Cawnpore Elec.	10	10	30/–	..	6 12 4
East African Power	7	7	27/–	..	5 3 8
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/–)	7½	7½	10/6	..	7 2 10
Madras Elec.	6*	4*	21/3	−1/6	3 15 4
Montreal Power	1½	1½	24	−1	6 5 0
Palestine Elec. "A"	Nil	Nil	20/9	..	—
Perak Hydro-elec.	6	7	7/6	..	18 13 4
Shawinigan Power	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	12½	..	—
Victoria Falls Power	15	15	77/6	..	3 17 4
Whitehall Inv. Pref.	7½	7½	15/–	..	10 0 0

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Feb. 16	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity.:					
1950-70	5	5	110	..	4 11 1
1955-75	5	5	115	..	4 7 0
1951-73	4½	4½	108	..	4 3 4
1963-93	3½	3½	103	..	3 8 0
1974-94	3¼	3¼	99	..	3 5 8
London Elec. Trans. Ltd.	2½	2½	95	..	2 12 10
London & Home Counties 1955-75	4½	4½	109	..	4 2 7
Lond. Pass. Trans.:					
A	4½	4½	119½	..	3 15 4
B	5	5	119½	..	4 3 8
C	1½	3	40	..	7 10 0
West Midlands J.E.A. 1948-68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	108½	..	5 10 8
Def.	1½	1½	25½	..	5 17 8
Anglo-Portuguese	8	8	15/–	−1/16	10 13 4
Cable & Wireless:					
5½ Pref.	5½	5½	104½	−2	5 5 3
Ord.	4	4	66	−2½	6 1 5
Canadian Marconi $1	Nil	4cts.	5/6	−6d.	3 0 0
Globe Tel. & Tel.:					
Ord.	8½*	8½*	30/–	..	—
Pref.	6	6	28/9	..	4 3 4
Great Northern Tel.:					
(£10)	20	20	14½	..	—
Inter Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	28/9	..	5 4 4
Oriental Tel. Ord.	11½*	16	57/6	..	5 11 4
Telephone Props.	6	6	10/–	..	12 0 0
Tele. Rentals (5/–)	10	10	9/–	..	5 11 1
Traction and Transport					
Anglo. Arg. Trans.:					
First Pref. (£5)	Nil	Nil	5/–	..	—
4% Inc.	Nil	Nil	8½	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	925	−10	4 17 3
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8	10	43/9	..	4 11 4
Brazil Traction	$1	50c.	13½	−¾	—
Calcutta Trams	8	5½	18/9	−1/16	5 17 4
Cape Elec. Trams	5	5	18/6	..	5 8 3
Lancs Transport	10	10	45/–	..	4 9 0
Mexican Light:					
1st Bonds	5	5	80	+5	6 5 0
Rio 5% Bonds	5	5	95½	+2	5 4 9
Southern Rly.:					
5% Prefd.	5	5	63½	−1	7 17 6
5% Pref.	5	5	107½	..	4 13 0
T. Tilling	10	10	48/9	+6d.	4 2 0
Tilling & B.A.	7*	6½*	52/6xd	..	2 9 6
West Riding	10	10	40/–	+6d.	5 0 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Feb. 16	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord. ..	Nil	7½	23/–	..	6 10 4
Assoc. Elec :					
Ord.	10	10	46/3	+1/16	4 6 9
Pref.	8	8	38/9	..	4 2 4
Automatic Tel. & El.	12½	12½	48/9	..	5 2 6
Babcock & Wilcox	11	11	44/6	–6d.	4 18 9
British Aluminium	12½	10	44/6	–1/4	4 10 0
British Insul. Ord.	20	20	93/9	+1/16	4 5 2
British Thermostat (5/–)	18½	18½	13/9	..	6 14 6
British Vac. Cleaner (5/–)	12½	10	11/3	..	4 9 0
Brush Ord. ..	Nil	Nil	4/6	..	—
Callender's ..	15	15	73/9	..	4 1 4
Chloride Elec. Storage	15	15	72/6	..	4 2 9
Consolidated Signal	17	17	77/6	..	4 7 8
Crabtree (10/–) ..	17½	17½	29/6	..	5 18 8
Crompton Parkinson Ord. (5/–) ..	30	20	29/6	..	4 9 0
E. K. Cole (5/–) ..	Nil	7	9/6	..	3 13 9
E.M.I. (10/–) ..	Nil	6	13/9	–9d.	4 7 3
Electric Construction	10	10	34/6	..	5 16 0
Enfield Cable Ord.	16½	12½	55/–	..	4 11 0
Elect. Switchgear (10/–)	16	10	20/–	..	5 0 0
English Electric ..	10	10	38/9xd.	..	5 3 0
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–) ..	25*	22*	41/3	..	2 13 3
Ever Ready (5/–) ..	40	40	31/6	+6d.	6 7 0
Falk Stadelmann ..	7	7½	22/–	..	6 16 4
Ferranti Pref. ..	7	7	27/6	..	5 1 10
G.E.C. :					
Pref.	6½	6½	33/9	..	3 17 2
Ord.	20	17½	82/6	..	4 5 6
Greenwood & Batley	15	13	27/6	..	9 9 0
Hall Telephone (10/–)	15	10	17/6	+6d.	5 14 3
Henley's (5/–) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	21/3xd.	..	4 4 8
Hopkinsons ..	15	15	47/–	..	6 7 10
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion ..	32½	30	107/6	..	5 11 6
J. Lucas	15	15	68/9	..	4 7 3
Johnson & Phillips	15	15	59/6	+9d.	5 2 0
Lancashire Dynamo	20	20	66/3	..	6 0 10
Laurence, Scott (5/–)	15	15	11/–	..	6 16 4
London Elec. Wire	7½	7½	25/–	..	6 0 0
Mather & Platt ..	10	10	42/–	–6d.	4 15 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	95/–	–½	4 4 2
Pye Deferred (5/–) ..	25	25	15/–	..	8 6 8
Revo (10/–) ..	5	20	25/7½	..	7 16 0
Reyrolle	12½	12½	57/6	..	4 7 0
Siemens Ord. ..	7½	7½	26/3	..	5 14 3
Strand Elec. (5/–) ..	2	4	3/6	..	5 14 4
S. Smith (1/–) ..	50	37½	7/–	..	5 7 2
Switchgear & Cowans (5/–) ..	10	15	10/–	..	7 10 0
Tel. Condenser (10/–)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg. (5/–)	9	9	9/–	..	5 0 0
Tube Investments ..	23¾	20	85/–	–9d.	4 14 3
Vactric (5/–) ..	4	Nil	4/–	..	—
Vickers (10/–) ..	10	10	16/3	–6d.	6 3 1
Ward & Goldstone (5/–)	20	20	19/–	+1/–	5 5 3
Westinghouse Brake	10	10	50/–	..	4 0 0
Walsall Conduits (4/–)	55	55	32/6	..	6 15 4
West, Allen (5/–) ..	7½	7½	5/9	..	6 10 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 253)

company's 7 per cent. preference shares, which were 24s. 6d. at one time last year, now being quoted nominally at 22s. 6d.

Rangoon Electric Tramway preference shares rarely change ownership. The last recorded transaction was on November 21st, 1941, when shares changed hands at 23s. The present price is about a guinea and the company's 4 per cent. debenture stock stands about 97.

Kalgoorlie Electric

The Kalgoorlie Electric Power & Lighting Corporation, which provides electricity for a number of the mines in Western Australia, recently ran short of firewood supplies. A shortage of wood cutters was the principal reason. To make matters worse, rains washed away a portion of the woodline, thereby cutting off transport of fresh supplies for the time being. The result was to throw out of employment several thousand miners. It was hoped to resume work on the mines in a short space of time, but the Power & Lighting Corporation may have to wait before it can fully replenish its reserves of firewood supplies. In consequence, the 10s. ordinary shares of the company have come to market at a little above the par price.

For several years past the company has paid 7½ per cent. dividends on the ordinary shares, and, with income tax deducted at a reduced rate, owing to Dominion income tax relief, the shares were regarded as a good investment of their type, carrying a measure of speculation. It is unfortunate that the present accidents should have happened at a time when most Australian investments are out of favour in consequence of the drastic proposals mentioned above. But the company has a profitable operational area, and at anything like 10s., the shares may attract the buyer who is prepared to put them away for their post-war prospects.

Home Railway Dividends

This week's announcements of dividend decisions by the Boards of the Home Railway companies, are awaited with attentive interest. Diversity of opinion prevailed in the Stock Exchange markets as to how the companies would elect to divide the amount of the Government " rent " to which they are entitled.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

1939

27981. "Apparatus for simultaneously measuring distances and directions of invisible objects from a movable or stationary spot." H. F. Rost and P. H. E. Claesson. October 16th, 1939. (542634.)

1940

7029. "Television synchronising circuits." Philco Radio & Television Corporation. May 4th, 1939. (542639.)

8841. "Telephone set circuits." Standard Telephones & Cables, Ltd. June 10th, 1939. (542643.)

10371. "Arc lamps." J. Gelb. June 14th, 1940. (542616.)

10464. "Alternating-current electric circuit-breakers of the gas-blast type." A. Reyrolle & Co., Ltd., D. F. Amer and W. H. Webb. June 17th, 1940. (Cognate application, 6532/41.) (542728.)

10492. "Radio transmission systems." Marconi's Wireless Telegraph Co., Ltd. June 17th, 1939. (542693.)

10546. "Extrusion apparatus." Standard Telephones & Cables, Ltd., and E. C. Lee. June 18th, 1940. (542694.)

10585. "Luminairs." Doane Products Corporation. July 8th, 1939. (542646.)

10586. "Lighting apparatus, and methods of making the same." Doane Products Corporation. July 8th, 1939. (542695.)

10688. "Water-cooling towers." L. G. Mouchel & Partners, Ltd., R. B. Elmer, and M. E. Gerard. June 21st, 1940. (542698.)

10702. "Arrangements for telegraph transmission." Standard Telephones & Cables, Ltd. (L. A. G. A. Braem and J. Sobola.) June 21st, 1940. (542730.)

11428. "Facsimile telegraph systems." Creed & Co., Ltd., A. E. Thompson, and R. D. Salmon. July 9th, 1940. (542700.)

11522. "Magnetic separators." F. E. Veglio. July 14th, 1939. (Addition to 523205.) (542664.)

11602. "Bearings for vacuum or low-pressure vessels." British Thomson-Houston Co., Ltd. July 13th, 1939. (542665.)

11819. "Direct-current electric motors." English Electric Co., Ltd., and A. S. Fenemore. July 17th, 1940. (542667.)

11832. "Electro-magnetic relays." Automatic Telephone & Electric Co., Ltd., and G. T. Baker. July 18th, 1940. (542668.)

11911. "Telegraph perforator." Creed & Co., Ltd. (Western Union Telegraph Co.). July 19th, 1940. (542705.)

11963. "Electric transformers." J. B. Hansell and Metropolitan-Vickers Electrical Co., Ltd. July 20th, 1940. (Addition to 426561.) (542654.)

12008. "Electro-magnetically controlled brakes." Babcock & Wilcox, Ltd., and A. Merry. July 22nd, 1940. (542708.)

12466. "Methyl silicone condensation products." British Thomson-Houston Co., Ltd. August 1st, 1939. (542655.)

12520. "Reactors variable by means of the grid bias on a valve." General Electric Co., Ltd., and L. C. Stenning. August 2nd, 1940. (542675.)

12728. "Time-delay mechanism for actuating electric switches." Partridge, Wilson & Co., Ltd., and H. G. A. R. Wilson. August 8th, 1940. (542676.)

13950. "Electric starters and switches." O. Ellefsen and Morecambe Electrical Equipment Co., Ltd. September 6th, 1940. (542680.)

14029. "Electric irons." British Thomson-Houston Co., Ltd. September 9th, 1939. (542681.)

14575. "Electrolytic refining of aluminium." Birmingham Aluminium Casting (1903) Co., Ltd., P. Pritchard, and G. O. Taylor. September 26th, 1940. (542738.)

14840. "Telephone substations." Standard Telephones & Cables, Ltd. (Nippon Electric Co., Ltd. (Nippon Denki Kabushiki Kaisha). October 3rd, 1940. (542739.)

14958. "Phase-control systems for synchronously-rotating mechanisms." Electrical Research Products, Inc. October 12th, 1939. (542688.)

15838. "Television control system." Hazeltine Corporation. December 8th, 1939. (542626.)

16801. "Electric contact-making relays." Creed & Co., Ltd. (Western Union Telegraph Co.). November 22nd, 1940. (542745.)

17067. "Electric cooking and heating apparatus." L. G. Hawkins & Co., Ltd., and L. G. Hawkins. November 29th, 1940. (542718.)

17325. "Bottom or footstep bearing for use in sensitive measuring apparatus, such as electricity meters. Landis & Gyr Soc. Anon. December 7th, 1939. (542719.)

1941

205. "Transformer for supplying polyphase rectifier." Akt-Ges. Brown, Boveri & Cie. January 6th, 1940. (542746.)

1807. "Hydraulic operating devices." British Thomson-Houston Co., Ltd. February 9th, 1940. (542720.)

3462. "Process for the de-scaling of steam boilers and prevention of subsequent scale deposits therein." H. W. Bannister, W. F. Gerrard and Liverpool Borax Co., Ltd. March 14th, 1941. (542751.)

3745. "Method of and means for holding permanent brake magnets of high coercive force." Landis & Gyr Soc. Anon. April 26th, 1940. (542752.)

1942

310. "Alternating-current electric circuit-breakers of the gas-blast type." A. Reyrolle & Co., Ltd., D. F. Amer and W. H. Webb. June 17th, 1940. (Cognate application, 311/42.) (Divided out of 542728.) (542722.)

Amended Specification

533858. "Heat exchange or other apparatus comprising parallel paths for the flow of fluid." Superheater Co., Ltd., and another.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bedwellty.—February 28th. Urban District Council. Electrical supplies for year ending March 31st, 1943. Specifications, etc., from Mr. Ben Jones, electrical and gas engineer, Municipal Offices, Aberbargoed.

Irlam.—February 28th. Urban District Council. Electric lamps. Forms of tender from the engineer and surveyor, Council Offices.

Kettering.—March 2nd. Electricity Department. Switchboard extensions, 4,000-kVA transformers, etc. (February 6th.)

Marple.—March 4th. Urban District Council. Cover tiles for cables, ducts, joint box compound, rubber and paper insulated cables. Specifications, etc. from Mr. A. E. Griffiths, electricity manager, Council Offices.

Rochdale.—February 21st. Corporation. Dish washer, hot-cupboards, etc., for British Restaurant. Specifications from director of education; Townhead, Rochdale. Tenders to town clerk, Town Hall.

Salford.—Electricity Department. Creosoted redwood joint boxes, meter boards and battens, electricity meters, cookers, fires, water heaters, washboilers, aluminium kettles, ironclad switches and service fuse boxes. Electricity Department, Frederick Road, Pendleton.

Weymouth.—March 3rd. Electricity Department. 750-kVA and 200-kVA transformers. (See this issue).

Orders Placed

London.—ST. PANCRAS.—Special Emergency (Finance and General Purposes) Committee. Accepted. Materials for replacement of superheater (£557).—Babcock & Wilcox, Ltd. Ventilating plant (£165).—Sturtevant Engineering Co., Ltd. Fire extinguishing equipment (£207).—Atlas Sprinkler Co., Ltd.

Middlesbrough.—Town Council. Accepted. Electric cable (£1,460).—Britannic Cable Co.

Salford.—Town Council. Accepted. Integral type uncontrolled superheater.—John Thompson Water Tube Boilers, Ltd. (£3,887). Ultra-high-frequency radio communication equipment for Police Force.—G.E.C. (£2,993).

Stretford.—Emergency Committee. Accepted. Lighting and heating 76 shelters.—N. G. Bailey (£2,278).

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Andover.—British Restaurant at Waverley Hall, High Street, and building in Mylen Road, for National Fire Service personnel; E. J. O. Gardiner, town clerk, Municipal Offices, Bridge Street, Andover.

Ashton-under-Lyne.—Alterations, etc., at Methodist Sunday School, Hillgate Street, for British Restaurant; A. T. Kemp, borough engineer, Municipal Buildings.

Banstead.—Additions at Institute, High Street for British Restaurant (£1,700); F. H. Wiltshire, clerk, Council House, Brighton Road, Banstead.

Bewdley.—Additional office accommodation at Load Street; borough surveyor.

Blackburn.—Remand home for girls at Wellington Street, St. John's; W. Pickstone, borough surveyor, Town Hall.

Bradford.—Wartime nurseries at Bierley, Lilycroft, Princeville, Thornbury and Wyke Schools, and restaurant, St. Andrew's School; city engineer.

Burnley.—Control room at a fire station; borough engineer, Town Hall, Burnley.

Cheshire.—Remand home, Alsager; E. M. Parkes, County Architect, The Castle, Chester.

Chesterfield.—Public cleansing station, Poolstock, for Chesterfield R.D.C.; J. B. Wikeley, engineer and surveyor, Rural Council House, Saltersgate, Chesterfield.

Colne Valley.—British Restaurants at Golcar and Linthwaite for U.D.C.; engineer, Spa Hall, Slaithwaite.

Consett.—Restaurants, Blackhill and Leadgate; T. P. Leath, U.D.C. surveyor.

Dartford.—Shelters (£1,300); W. F. Blay, Ltd.

Donnington.—Police station (£6,028); J. A. Harvey, Market Drayton.

Dorchester.—Restaurant (£1,500); borough engineer.

Droitwich.—Factory additions and dust extractor; G. R. Pinnegar, cleansing materials manufacturer, Old Workhouse Buildings.

Frodsham.—Houses at Manley for Runcorn R.D.C.; A. J. King, engineer and surveyor, Council Offices, Castle Park, Frodsham, Warrington.

Glasgow.—Pump house, Provan chemical works; gas engineer.

Canteen, Helen Street, Govan; Gourock Rope Co., Ltd.

Golborne.—Works canteen; Naylor Bros., Ltd., Edge Green Lane.

Kettering.—Extensions, boot and shoe factory, Charles Street; W. Timpson, Ltd., North Park.

Leadgate (Co. Durham).—Works canteen, Eden Colliery, for the Consett Iron Co., Ltd.; J. J. Eltringham, Derwent Street, Blackhill.

Leek.—Extensions; W. Stannard & Co., Buxton Road.

Liversedge.—Extensions, glass works; Fountain Glass Co., Ltd., Roberttown.

London.—CAMBERWELL.—Temporary library, Peckham Hill Street; borough engineer.

Loughborough.—Nursery school; W. Granger, borough surveyor, Town Hall.

Malvern.—British Restaurant at junction of Worcester Road and Pickersleigh Road, for U.D.C.; C. C. Judson, Surveyor, The Council House.

Manchester.—Pump house, Red Bank; W. E. Cary, Ltd., Adeline Street, Manchester, 4.

Four lock-up shops, Northen Etchells; G. Noel Hill, city architect, Town Hall, Albert Square, Manchester, 2.

Extensions to dairy, Oak Street and William Street, Didsbury; A. Heald, Ltd., Didsbury, Manchester, 20.

Extensions to drapery showrooms and goods hoist to warehouse, Pollard Street, Ancoats; Architect's Department, C.W.S., Ltd., 1, Balloon Street, Manchester.

Medway.—Adaptation of buildings, rear of Technical College, for workshop accommodation; Kent County Architect, Sessions House, Maidstone.

Mirfield.—Extensions to Gilder Hall Club (£1,100); R. Armitage, president, Gilder Hall Club, Greenside Road, Mirfield.

Newcastle-on-Tyne.—Soldering department for I. A. Hodgson & Co., tin box manufacturers, etc., Heaton Junction; Cackett, Burns Dick & McKellar, Eldon Square.

Extensions, Lee's Bakeries, Ltd., Coast Road; Marshall, Tweedy & Bourn, Grainger House, Blackett Street, Newcastle.

Electric lighting installation at administrative block of the Newcastle City Hospital, Shotley Bridge; J. O. C. Solomon, city property surveyor, Town Hall.

New premises to replace the Locomotive Inn, for Ridley, Cutter & Firth; Hetherington & Wilson, County Chambers.

Newport (I.o.W.)—Offices and store for Saro Laminated Wood Products, Ltd.; S. W. Wendes, architect.

Pendlebury.—Additions; Weston, Evans & Co., Ltd., lubricating engineers, Manchester Road, Clifton.

Peterborough.—Shops, Alexandra Road; J. Smith.

Prestwich.—Dining hall for staff at County Mental Hospital; Cruickshank & Seward, architects, 16, Princess Street, Manchester, 1.

Redditch.—Houses, Greenlands estate, Studley Road; L. O. Wilkes, surveyor, The Council House.

Rochester.—Wartime nurseries, St. Margaret's Street, and at Strood Institution; town clerk, Guildhall, Rochester, Kent.

Sheffield.—Annexe (50 beds) for City General Hospital; W. G. Davies, city architect, Town Hall.

Shropshire.—Extensions to A.R.P. headquarters (£1,000); county architect, Shirehall, Shrewsbury.

Wallsend-on-Tyne.—Extensions, miners' canteen, Rising Sun Colliery; Newcombe & Newcombe, Eldon Square, Newcastle-on-Tyne.

Tests on Asbestos

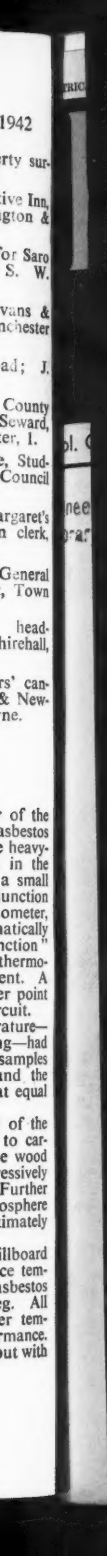
ALTHOUGH war requirements are making immense demands on asbestos, there appears to be little danger of these demands exceeding the supply. Over 60 per cent. of the world's normal demand was met by the British Empire, viz.: Canada, Southern Rhodesia, the Union of South Africa, Australia, Tasmania and New Zealand.

Asbestos is rock of volcanic origin, called olivin, a silicate of magnesia, which is quarried or mined from veins and pockets in a matrix of rock, and sorted into two classes, containing long or short fibres. After the rock has been crushed the fibres are separated into fine pliant strands and removed by compressed air. Long fibres are spun into yarn which can be twisted into rope or woven into cloth. Asbestos with fibres too short for spinning is pulped into paper or pressed into felt and boards. In any form it retains its fire and acid resisting, heat and sound insulating qualities.

In a test by Bell's Asbestos & Engineering, Ltd., an electric muffle furnace rated at 230 V, 2,100 W, was used to obtain comparative data of the transmission of heat by conduction through asbestos bulkheads, heat-resisting building material, asbestos paper, millboard, millboard backed by felt and wallboard. The temperature of the furnace was controllable rheostatically over a wide range. An asbestos sample, 7 by 7 in., was attached to the front face of the muffle furnace—the door of the furnace being removed—so as to overlap the front opening, and a ¼-in. five-ply birchwood sample of similar dimensions was placed over the asbestos.

An electric thermo-junction pyrometer of the surface type was inserted between the asbestos and the wood samples, and another of the heavy-duty type enclosed in a silica envelope in the body of the furnace protruded through a small hole in the back. The two thermo-junction points were connected to a sensitive galvanometer, calibrated in deg. F., through automatically compensating leads whereby the "cold junction" was transferred from the head of the thermo-couple point to the indicating instrument. A two-way double-pole switch allowed either point to be rapidly thrown into the indicator circuit.

When a steady predetermined temperature—about the maximum for a burning building—had been attained, the asbestos and wood samples were applied to the furnace opening and the temperature at their junction was noted at equal intervals of time.

After a certain time the inner surface of the wood, adjacent to the asbestos, started to carbonise. The charring then penetrated the wood to the outer surface, which became progressively blackened and later began to crack. Further temperature rise and exposure to the atmosphere led to the edges of the crack glowing and ultimately to the wood round it catching fire.

Experiments on asbestos paper and millboard were successfully performed with a furnace temperature of 1,700 deg. F., and on asbestos specimens thicker than 3/32 in. at 1,800 deg. All tests were then carried out at the higher temperature to ensure a standard performance. Wooden strips 7 by 2 in. were also tested, but with negligible divergence in results.